U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS

April 20, 1965

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Abstract Journal

for

Science and

Industry

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U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

Issued twice a month by the Clearinghouse for Federal Scientific and Technical Information (formerly Office of Technical Services). Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Address changes should be sent to Superintendent of Documents.

PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS (formerly U.S. Government Research Reports) is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability to the public of new reports of U.S. Government-sponsored research and development released by the Department of Defense and other Federal agencies. The Atomic Energy Commission and the National Aeronautics and Space Administration issue their own announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by accession/report number under 33 subject division headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes. Reports of current high industrial interest are featured in **"Research Highlights."**

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting accession/report numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject divisions; the various indexes will aid in locating those reports. Cumulative indexes are published periodically.

TO ORDER REPORTS

Order reports by accession/report number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Superintendent of Documents deposit account. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. Reports available are listed in the following journals open to public subscription from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $25 a year domestic, $31 foreign, $1.50 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated.
Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

special ANNOUNCEMENTS

ORDER TECHNICAL MANUALS FROM SOURCE

The Clearinghouse has discontinued dissemination of technical manuals and orders on operation and maintenance of military equipment. Requests and payments will be returned to the sender. They are to be ordered from the agencies of origin as follows:

Navy manuals--The Bureau of Ships or the Bureau of Naval Weapons, Washington, D.C. 20360.

Army manuals--The Department of the Army, Supply Operations, Room 2415, Code AGAMDI, 2nd & S Streets, S.W., Washington, D.C. 20315.

Air Force manuals or orders--Oklahoma City Air Material Area (OCNSTT), Tinker Air Force Base, Oklahoma 63145.

NASA TECH BRIEFS AVAILABLE FROM CLEARINGHOUSE

Tech Briefs prepared by the National Aeronautics and Space Administration to acquaint industry with the technical content of innovations growing out of the space program research may be purchased from the Clearinghouse.

Each one- or two-page illustrated Tech Brief describes items selected from NASA's advanced technology that may be of particular interest to commercial and other non-aerospace applications. Items selected for Tech Briefs include products or devices, manufacturing processes and techniques, and materials.

The NASA Tech Briefs will be distributed monthly and may be purchased on an annual subscription basis in five categories. Subscriptions are available to all categories for $20 a year. The briefs are also available at 15 cents each. Tech Brief subscriptions are on a calendar year basis beginning in January. Prices for individual category subscriptions are:

Electrical-Electronic	$6.00
Energy Sources	2.50
Materials	5.00
Life Sciences	2.50
Mechanical	6.00

All Tech Briefs issued in 1964 (221 total in all categories) are available at a special price of $10 from the Clearinghouse, U. S. Department of Commerce, Springfield, Va. 22151.

A SINGLE INDEX FOR NEW FEDERAL R&D REPORTS

A Clearinghouse publication beginning in April 1965 provides scientists, engineers, librarians and management with a single index to new unclassified Government-sponsored technical reports.

Entitled Government-Wide Index to Federal Research and Development Reports, it will be made up from machinable index records prepared by the Atomic Energy Commission, National Aeronautics and Space Administration, Department of Defense, and the Clearinghouse.

Government-sponsored research reports included in the following agency announcement journals will be indexed in the new publication:

Nuclear Science Abstracts (AEC)

Scientific and Technical Aerospace Reports (NASA)

Technical Abstract Bulletin (Defense Documentation Center)

U.S. Government Research and Development Reports (Clearinghouse)

Appearing the 15th of each month, the Government-Wide Index will list the reports announced during the previous month.

For this project, the Clearinghouse is initially using the computer facilities of the Aerospace Research Applications Center at the University of Indiana. The journal records, in the form of punched paper tapes, magnetic tapes, and cards, are fed into the computer which merges them into a single index under the five access points of subject, corporate author, personal author, accession number and report number.

How to Order

The Government-Wide Index to Federal Research and Development Reports will be printed and sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. Price is $10 for a one-year subscription (12 issues); add $2.50 for foreign mailing; single issue, $1.25. Make remittance payable to Superintendent of Documents.

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FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. Government agencies and provides reference, interlibrary loan, and reproduction services.

Carnegie Library of Pittsburgh
4400 Forbes St.
Pittsburgh, Pa. 15213

Columbia University
Engineering Library
Seeley W. Mudd Building
New York, N. Y. 10027

Georgia Institute of Technology
Price Gilbert Library
Atlanta, Ga. 30300

The John Crerar Library
35 West 33rd St.
Chicago, Ill. 60616

Library of Congress
Science and Technology Division
Washington, D. C. 20540

Linda Hall Library
5109 Cherry Street
Kansas City, Mo. 64100

Massachusetts Institute of Technology
M. I. T. Libraries
Cambridge, Mass. 02139

Southern Methodist University
Science Library
P. O. Box 1339
Dallas, Tex. 75222

University of California
General Library
Berkeley, Calif. 94704

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
Seattle, Wash. 98105

CUMULATIVE INDEXES

The following Cumulative Indexes for U. S. Government Research and Development Reports (formerly U. S. Government Research Reports) are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 38	Annual Cumulative Index January - December 1963 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Cumulated Index May - December 1963 Includes Technical Abstract Bulletin only.	$3.50
	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50
Volume 37	Annual Cumulative Index January - December 1962 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 36	July - December 1961	$3.50
Volume 35	January - June 1961	$1.00
Volume 34	July - December 1960	$1.00
Volume 33	January - June 1960	$1.00
Volume 32	July - December 1959	$1.00

For information regarding the availability of earlier indexes write to the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151.

RESEARCH highlights

Reports of current high industrial interest

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Communications

RADIO INTERFERENCE LOCATION AND PREVENTION

Radio interference from overhead power lines has provoked the Navy to compile a handbook that gives practical methods for the location and prevention of this growing problem. Because of the expanding use of electrical and electronic equipment and sensitive radio receiving equipment and instrumentation, the prevention of interference is becoming more important. The problems are more numerous, extensive, and difficult. The handbook describes the forms of interference and its characteristics, sources of interference on lines, and location of utilization equipment (such as electric razors, X-ray machines, and d.c. motors in general). Order from the Clearinghouse AD-612 190, HC $3.00/ MF 50 cents; A PRACTICAL HANDBOOK FOR LOCATION AND PREVENTION OF RADIO INTERFERENCE FROM OVERHEAD POWER LINES. (This report cited in this issue, see page 45.)

Data Processing

ELECTRONIC EAR FOR SPEECH RECOGNITION

An electronic model of the human ear has been designed to analyze and classify complex sounds. Consisting of an electrical middle ear simulation followed by an "artificial" cochlea, the device will hopefully realize some of the ear's ability to recognize sophisticated sound patterns, including human speech. Working on the precept that Nature can suggest better solutions to engineering problems, designers thought that a synthesized system based on a model of the ear might achieve the ear's superior recognition of complex audio signals. Their laboratory design emphasizes the inner ear (specifically the basilar membrane of the cochlea) which in the actual ear is moved by sound energy, the movement thereby exciting hair cells which in turn produce electrical nerve signals. The signals are then further processed and shuttled to the brain. The output of the electronic model "ear" will drive artificial neurons arranged for a similar processing technique. Order from the Clearinghouse AD-611 778, HC $2.00/ MF 50 cents; PROPOSAL FOR AN ANALOG COCHLEA. (This report cited in this issue, see page 215.)

QUALITY CONTROL

A manual compiled for the U.S. Army Electronics Command describes the quality control procedures followed by the Rectifier Components Department of the General Electric Company. The practices set forth in the manual are designed to offer the highest quality product commensurate with the current state of the semiconductor art. Four major phases make up the concept of total quality control: product planning, product design, manufacturing, and post production corrective action. The ultimate goal is to maintain product quality by meeting high standards of performance, workmanship, and reliability. Order from the Clearinghouse AD-611 835, HC $5.00/MF $1.25; QUALITY CONTROL MANUAL, RECTIFIER COMPONENTS DEPARTMENT. (This report cited in this issue, see page 200.)

RELIABILITY & MAINTENANCE

A handbook defining the Air Force Electronic Systems Division policy matters in reliability and maintenance points out what R/M items potential contractors are expected to cover in a technical proposal. The publication covers nine distinct problem areas, potential or actual, and provides in a single volume pertinent information, guidance, and procedures on R/M. It reviews the overall operations and problems involved in the monitoring of a contractor's program, mathematical aspects of reliability decision making, and guidance on incentive contracting for reliability. Order from the Clearinghouse AD-611 577, HC $6.00/MF $1.50; HANDBOOK FOR RELIABILITY AND MAINTAINABILITY MONITORS. (This report cited in this issue, see page 47.)

SOLDER BALLS IN SILICON ALLOY TRANSISTORS

Solder balls of 99% tin that form and cause short circuits in silicon alloy transistors are usually produced by the devices themselves rather than by any foreign matter in the package as has been previously believed. The fault lies with the low melting temperature tin alloy used in the construction of the transistor. A problem plaguing the transistor and semiconductor industry during the past few years, the solder ball condition exists when local hot spots develop as the result of secondary breakdown, or temperatures rise in excess of 230°C, or during life testing or "burn in." These findings apply to high power silicon alloy-diffused transistors and high reliability medium power silicon alloy transistors. Emitters for the devices have been made of nearly 99% tin with small amounts of arsenic and aluminum for doping. The base contact is composed of a lesser amount of tin and the balance aluminum. Balls have not been found in other types of silicon transistors, such as planar or mesa devices. The problem may exist, however, in other devices such as rectifier diodes, regulator diodes, and other related devices using a similar tin construction. Order from the Clearinghouse AD-612 063, HC $1.00/MF 50 cents; "SOLDER BALL" FORMATION IN SILICON ALLOY TRANSISTORS. (This report cited in this issue, see page 56.)

Fuels

COST REDUCTION TOOL FOR COAL INDUSTRY

Computer programming to analyze many complex coal mining problems can have a profound effect on the industry, according to studies made for the Office of Coal Research, Department of the Interior. The programs can be used to explore a number of areas for significant cost reductions. For example, mining methods, mining conditions, and new equipment can be evaluated. New equipment can be designed, capital expenditures justified, production standards developed, and management personnel trained. Optimization can be attained by eliminating or minimizing the effect of undesirable elements in a system to provide a more efficient operation. The three-phase study uses computer programs in which practical experience and judgment are combined with modern scientific tools to make decisions previously based on intuition and limited supporting facts. Order from the Clearinghouse PB-166 291-1, HC $2.00/MF 50 cents, OPTIMIZATION OF UNDERGROUND MINING, VOL. I: A NEW COST REDUCTION TOOL FOR THE COAL INDUSTRY; PB-166 291-2, HC $7.15/MF $1.25, OPTIMIZATION OF UNDERGROUND MINING, VOL. II: TECHNICAL REPORT; PB-166 291-3, HC $5.00/MF $1.00, OPTIMIZATION OF UNDERGROUND MINING, VOL. III: COLLECTING MINING DATA.

Metals, Non-Ferrous and Alloys

STAINLESS STEEL PROPERTIES AND FABRICATION

A 2-volume information manual on the properties and fabrication of stainless steels used at the Savannah River Laboratory can be used to provide data on physical and mechanical properties for equipment design. For instance, it points out that the stainless steels are extremely vulnerable to several forms of corrosion and they demand very careful evaluation of conditions of exposure, realistic corrosion testing, and careful choice of suppliers of mill products. Volume I gives the classifications and characteristics of the stainless steels, composition and properties, forms of corrosion, resistance to corrosion, oxidation, radiation, and structure. Volume II covers fabrication, heat treatment, testing and inspection, mill products, plus miscellaneous information such as galling and wear tests in water. Order from the Clearinghouse DP-860 Volume I, Properties, HC $3.00/MF $1.25; DP-860 Volume II, Fabrication, HC $4.00/MF $1.75; STAINLESS STEEL INFORMATION MANUAL FOR THE SAVANNAH RIVER PLANT.

Metalworking and Metal Forming

MACHINING TITANIUM ALLOYS

An updated review of the machining of commercial titanium alloys prepared by the Defense Metals Information Center combines information from DMIC publications with more recent data received from the Federal Aviation Agency, Government reports, and personal interviews. A section on conventional machining covering milling operations describes milling machines, cutters, tool materials, feeds, depth of cuts and cutting speeds, cutting fluids, and general techniques and inspection. The review also discusses the operations of face milling, peripheral milling, turning and boring, drilling, and tapping. Another section offers guides to precision wheel and abrasive belt grinding. Order from the Clearinghouse AD-611 846, HC $2.00/MF 50 cents; MACHINING OF TITANIUM ALLOYS. (This report cited in this issue, see page 201.)

The abundance of R&D reports available creates a problem for industry in extracting those most likely to prove of value--for technical solutions and in keeping up with new developments. These Clearinghouse tools and services, and others planned, are designed to narrow the search.

PINPOINTING R&D REPORTS

Selection Aids For Industry

▶ GOVERNMENT-WIDE INDEX appearing monthly is a uniformly indexed, single reference guide to Government-sponsored research and development announced in four of the major technical announcement journals of the Federal Government: USGRDR, Technical Abstract Bulletin of the Defense Documentation Center, Nuclear Science Abstracts of the Atomic Energy Commission, and Scientific and Technical Aerospace Reports of the National Aeronautics and Space Administration. (Annual Subscription $10, $2.50 additional for foreign mailing, $1 single copy.)

▶ SELECTIVE BIBLIOGRAPHIES--from Abrasives to Zirconium--will be mailed free. A list of more than 200 available from the Clearinghouse will be mailed on request.
Here is a sample list of ten:

SB-441 Materials Testing	SB-523 Batteries
SB-444 Electronic Miniaturization	SB-524 Expanded Plastics
SB-480 Textile Fibers	SB-526 Metal Composites
SB-515 Paper	SB-529 Hydrofoil Boats
SB-518 Paints and Varnishes	SB-541 Fluid Amplifiers

▶ LITERATURE SEARCHING SERVICE provides two kinds of bibliographies:
a) Current Awareness on selected fields of interest on a periodic basis.
b) Retrospective, listing the literature available to date.
These searches are made to order using the combined facilities of the Clearinghouse, the Science and Technology Division of the Library of Congress and the science collections of the Departments of the Interior and Agriculture, or any combination of these facilities at $11 an hour (8 hours minimum searching time).

▶ FAST ANNOUNCEMENT SERVICE reviews reports of special industrial significance. Announcements are classified and mailed by industrial category. No charge.

▶ RESEARCH REVIEWS at 50 cents a copy are packaged summaries, abstracts and bibliographies gathered under titles of industrial interest. The first ten are highlighted in the following pages.

RESEARCH REVIEWS PACKAGED for INDUSTRY

by

The Institute for Applied Technology
NATIONAL BUREAU OF STANDARDS

Highlighted here are the first ten in the series, A Review of Selected U.S. Government Research and Development Reports.

The publications, priced at 50 cents each, contain resumes, abstracts and bibliographies of Federally sponsored research and development reports gathered under titles of special interest to industry.

They and the reports they refer to may offer ideas for product development or suggest means of reducing costs. The series, as well as most of the reports reviewed in it, are available from the Clearinghouse. New titles are in process. Please order by OTR number.

HOT MACHINING (OTR-101)

Hot machining offers easier and cheaper turning and milling of many metals and alloys, Government studies indicate. According to a summary describing these studies, the greatest improvements possible in tool life, cutting speeds, and costs are for hardened low alloy and tool steels. On AISI 4340 steel hardened to 600 Brinell, the summary indicates, there is an increase of tool life of 20 times at 900°F over that at room temperature for the same cutting speed. The increase in tool life of Thermold J alloy tool steel may reach 40 times, and increases of 5 to 7 times are noted for stainless steels. Results of tests on face- and end-milling steels are similar to those for turning. Milling of nickel and cobalt alloy requires higher work temperatures but is improved by the use of asbestos to lubricate or reduce the tool impact. Order from the Clearinghouse OTR-101, 50 cents.

NICKEL-TITANIUM ALLOYS (OTR-102)

Intensive Government research is in progress on nickel-titanium and other malleable intermetallic compounds with unusual high-strength at elevated temperatures, wear and corrosion resistance, and elastic and damping properties. The studies should increase knowledge of workability and structural properties, making the alloys more useful to industry. A summary describing the investigations indicates the so-called Nitanol series of nickel-titanium alloys with from 52 to 56 weight percent nickel offers many potential applications in nonmagnetic tools, bearings, instruments, underwater structures, chemical handling equipment, cutlery, vibration absorption devices, temperature-sensors, and wear resisting items. The alloys can be hot worked by extrusion, rolling, forging, or swaging down from ingot size at temperatures between 700 and 950°C. Hot-worked materials may then be worked at room temperatures with intermediate anneals. Alloys containing excess nickel (up to 62 percent by weight) are capable of being hot and cold worked with slightly more difficulty; however, they can be hardened by heat treatment to as high as 62 Rc. This hardness in a nonmagnetic corrosion-resistant material is exceptional. Order from the Clearinghouse OTR-102, 50 cents.

PHOTOCHROMISM and PHOTOTROPISM (OTR-103)

Government agencies have been responsible for important contributions in the fields of photochromisms and phototropism. Though the object of much of this research has been the development of eye protection against the flash of nuclear explosions, a summary describing the investigations indicates there are other potential applications for the findings. These include the development of objects for the control of sunlight exposure and/or snow glare, such as windows, window shades, windshields, and sunglasses, as well as optical memory devices for computers and valves for modulating or monitoring light. One project, for example, is aimed at development of a self-attenuating light valve as an eye-protective device. The researchers determined the properties of phototropic materials as well as design factors for a phototropic-type valve (filter). Such information, according to the summary, might be adapted to the design of light valves for both optical and nonoptical systems in which variation of the quantity of light is used in a modulating or monitoring capacity. Order from the Clearinghouse OTR-103, 50 cents.

FIRE–EXTINGUISHING MATERIAL TECHNOLOGY (OTR-104)

Both industries and communities stand to benefit from Government research in fire extinguishing materials. Though much of the research was aimed at solution of military and aerospace fire-control problems, a summary describing these investigations indicates a great deal of valuable information was gathered on some of the latest innovations for effective control of many kinds of fires. These include Class A type (ordinary flammable materials like wood) and Class B type (flammable liquids and gases). One particularly significant research project evaluated the effectiveness of increasing the viscosity of water by adding chemicals such as sulfonated polyvinyl toluene and caroxymethylcellulose. Large scale laboratory tests conducted by the Navy indicated a 75 percent improvement for such a mixture over plain water in Class A fire control. Researchers also determined optimum nozzle design and an effective sprinkler system for indoors. Order from the Clearinghouse OTR-104, 50 cents.

FLAME-RETARDANT TEXTILES (OTR-105)

Federal agencies are continuing efforts to improve the flame-resistance of fabrics. They have conducted important studies in such areas as fabric thermal conductivity and destructive temperatures as well as in testing apparatus to determine thermal behavior of fabrics. They have also sought to find coatings which make the more familiar materials such as nylon and cotton more fire-resistant. Much of this research has been successful and is of great value to industry, a summary describing the investigations indicates. The summary cites among several studies one that established the testing apparatus and analysis necessary to determine thermal conductivity of a fabric, the interface temperatures at the point of contact of the fabric with the backing materials, and the surface temperature at the point of contact with the flame. A triple treatment of divinylbenzene copolymer coated with tetrachlorodiamine and phosphonium chloride followed by copolymer coating to impart flame resistance to nylon was discovered in other research. A third study found certain catalysts to combine with tris-1-aziridinyl phosphone oxide to help produce durable flame resistancy in cellulosic fabrics. Order from the Clearinghouse OTR-105, 50 cents.

HUMIDITY-CONTROLLED WAREHOUSING (OTR-106)

Recent Government research has looked into preservation methods and the economics of storage in a variety of environments. Studies have also been made on storage of food, water, and equipment as well as on the design of humidity-controlled warehouses. The results of this research, according to a summary describing the studies, are of considerable value to manufacturers and others seeking to improve the storage life of materials. One 5-year study examined the effectiveness and economics of humidity-controlled storage of the following types of equipment: fluid-handling, motor-generators, automotive, heating, non-metallic, tools, instruments, and communications. Another study investigated the major aspects involved in successful warehousing, including identification and control of deterioration forces such as climate and corrosion. A third study discusses the use of thin metal-film corrosion indicators, devices that are sensitive to relative humidity above 40 percent and indicate the amount present by changes in color of the film-coated area from silver-gray to orange-brown. Order from the Clearinghouse OTR-106, 50 cents.

CONCRETE TECHNOLOGY (OTR-107)

Considerable progress has been made by Government laboratories and cooperating private research institutions in the improvement and application of concrete and its constituent materials during recent years. A summary describing these studies indicates they will help private industries initiate many improvements in existing products as well as establish new applications. One outstanding study described in the summary established that nylon and other plastic fibers when added to the mix, impart tremendous strength and resiliency to concrete. Nylon increases strength to more than 27 times that of unreinforced concrete. The plastic fiber additions may prove to be superior to steel wires because the latter increase flexural strength and shatter resistance but not resiliency. The summary discusses work in these major areas: (1) improvement of strength or decreased water transmission through conventional composition concrete; (2) improved shock resistance in lightweight concrete; (3) strength and corrosion protection of steel-reinforced concrete; (4) prestressed concrete applications; and (5) protective coatings for concrete. Order from the Clearinghouse OTR-107, 50 cents.

VOLATILE CORROSION INHIBITORS (OTR-108)

Studies carried out by Government agencies show that volatile corrosion inhibitors have potentially wide application in delivering products to the consumer in more ready-to-use condition. According to a summary prepared by technologists of the Institute for Applied Technology, National Bureau of Standards, volatile corrosion inhibitors will succeed when used with effective moisture resistant packaging materials. Researchers therefore developed a heat-sealable polyester material to be used with a volatile corrosion inhibitor to provide protection in very humid environments. Steel items so packaged withstood corrosive attack for 12 months in very humid environments and for longer periods in less humid storage areas. The summary describes studies carried out in three broad areas: evaluation of the time in which steel is fully protected under varying external conditions, effect of inhibitor materials upon nonferrous metals, and the effect of the outside packaging materials. Order from the Clearinghouse OTR-108, 50 cents.

GREASE LUBRICATION (OTR-109)

Research in grease lubrication conducted by Federal agencies will provide useful information to manufacturers and others. The studies determined how to increase the life of steel parts exposed to sliding, rubbing, and rolling friction, together with heavy loadings and vibrations. A summary describing this research discusses surfaces in contact with lubrication formulations, additives to reduce corrosion, and variations in method and degree of loading and vibration. Additives such as imide-type thickeners are possible for enabling greases to perform well at high temperatures, for example. One aluminum imide thickener tested has a melting point of over 1000°F. Twenty-one greases in various proportions are identified in another study discussed in the summary. Some of these formulations achieved favorable performance after prolonged periods of testing. The summary also gives bibliographies of reports. Order from the Clearinghouse OTR-109, 50 cents.

THERMOELECTRIC MATERIALS and FABRICATION (OTR-110)

Because thermoelectric generators enjoy several advantages over conventional power sources for low power application, considerable Government-supported R&D has been devoted to improving the efficiency and reliability of thermoelectric materials, while other projects have been concerned with determining methods and materials for joining thermoelectric materials to metallic connectors. Although not yet economically suitable for large scale energy conversion, actual units have been developed for certain specialty applications. Notable among these is a 35-pound propane fired portable generator which has demonstrated the capability of producing 267 watts. A 100-watt generator powered by radioisotopes operates at 554°C and 171°C hot and cold sides respectively and attains an overall efficiency of 5.2 percent. The principal advantages of these portable power packs are their small size and low weight, ease of maintenance, and silence of operation. They can be coupled to a variety of heat producing sources including engines and nuclear plants. Order from the Clearinghouse OTR-110, 50 cents.

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-611 532 Div. 1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EJECTION SEAT WITH HINGE SUSPENDED POWDER ACCELERATOR,
by N. V. Kirsanov. 11 Feb 65, 5p FTD-TT-64-943
TT 65-61777

Unclassified report

Unedited rough draft trans. of Russian patent 160,956, appl. no. 788,059/40-23, 21 Jul 62.

Descriptors: (*Ejection seats, Stabilization systems), Cartridges (PAD), Suspension devices, Center of gravity, Explosive actuators, Aerodynamic control surfaces, Aviation safety, Patents, USSR.

The ejection seat is characterized by the fact, that for the purpose of increasing the height of ejection and automatic stabilization of the ejected object in flight, the powder accelerator is hinge suspended above the CG of the seat and is provided with a stabilizer (aerodynamic flaps).

AD-611 534 Div. 1, 25
CFSTI Prices: HC$3.00 MF$0.75

Allied Research Associates, Inc., Concord, Mass.
THERMOELASTIC STRESS CONCENTRATIONS.
Rept. for Nov 63-Jan 65,
by Frederick Bird and Herbert Becker. Feb 65, 53p
Rept. no. ARA-F-257-12
Contract AF33 615 1241
FDL TDR-64-173

Unclassified report

Descriptors: (*Thermal stresses, Elasticity), (*Elasticity, Thermal stresses), Tensile properties, Stresses, Mathematical analysis, Deformation, Sheets, Rectangular bodies, Photoelasticity, Fatigue (Mechanics).

Thermal stress concentration factors were determined for rectangular flat plates, some of which were penetrated by holes and some which had filleted width changes. The experimental data indicate that the thermal stress concentration factors would be less than tension stress concentration factors for the same bars. Additionally, the peak thermal stress was found to be smaller in magnitude than the nominal applied thermal stress, except for one case in which the peak stress at the hole was 1.2 times the applied stress. (Author)

AD-611 552 Div. 1, 33
CFSTI Prices: HC$2.00 MF$0.50

Federal Aviation Agency, Washington, D. C.
Environmental Development Div.
FOG CHAMBER TESTS OF CATEGORY II APPROACH, TOUCHDOWN AND RUNWAY CENTERLINE LIGHTING SYSTEMS.
Interim rept.,
by Leslie C. Vipond. Nov 64, 50p Rept. no. RD-64-107
Proj. 430 201 01E

Unclassified report

Prepared from data obtained under Contract ARDS-434 by the University of California.

Descriptors: (*Fog, Landing aids), (*Landing aids, Lighting equipment), (*Landing lights, Runways), All-weather aviation, Night landings, Flight testing, Approach, Airports, Flight simulators.

The report describes testing of airport lighting systems in day and night fog conditions utilizing a very large chamber and producing fog by compressed air and water through nozzles installed along the side of the chamber. The test results reported are those for restricted visibility conditions defined as Category II, wherein the visual range was 1200 ft. Peak candlepower values and photometric distributions required for Category II operations were determined during the tests covered by this report. Various patterns of lights were installed on the floor of the chamber and simulated approaches and landings were made through the fog using a total of 36 experienced pilot observers. The observers rode in an airplane cockpit suspended from overhead rails. The tests showed that present visual aids could be considered adequate, although marginal, for Category II operations at night. In day time fog, however, the higher background brightness had a profound effect and made some of the standard components inadequate. (Author)

AD-611 553 Div. 1
CFSTI Prices: HC$2.00 MF$0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J. Experimentation Div.
LIMITED SURVEY OF COMMERCIAL JET AIRCRAFT ALTIMETER SYSTEM POSITION ERROR BY PACER WITH TRAILING CONE.
Final rept.,
by Jack J. Shrager. Dec 64, 34p
Proj. 320 205 02X
FAA RD-64-157

Unclassified report

Descriptors: (*Altimeters, Tests), (*Jet planes, Altimeters), (*Commercial planes, Jet planes), Civil aviation, Aviation safety, Measurement, Airspeed, Errors, Graphics, Towed bodies.

Limited flight tests were conducted using the trailing cone static pressure measuring technique to determine the repeatability of commercial jet aircraft altimeter systems. The maximum difference between the six types tested at 30,000 feet was 500 feet. (Author)

AD-611 570 Div. 1, 19
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
THE RAINBOW OPTICAL LANDING AID.
Interim rept.,

by Barbour Lee Perry. 1 Feb 65, 22p
Rept. no. NRL-6184
Proj. RS11 50 016 652 1F012 06 02
Unclassified report

See also AD-611 571.

Descriptors: (*Landing aids, Optical equipment), (*Night landings, Carrier landings), (*Glide path systems, Human engineering), Aviation safety, Guidance, Flight paths, Display systems, Colors, Sensitivity, Aircraft carriers, Errors, Geometry, Control systems, Effectiveness, Mathematical analysis.

The report describes the Rainbow Optical Landing Aid and contains a mathematical analysis of the pilot-aircraft-Rainbow-geometry loop. The analysis underscores the salient characteristics of the Rainbow display which lead to precise, easily controlled landings. The Rainbow Optical Landing Aid was developed to provide the pilot with quickened glide path information by means of a color-sequence coded signal. A red-white-blue sequence tells the pilot to increase his sink rate; a red-blue-white sequence indicates that a smaller sink rate is required. A steady green informs the pilot that he is within ±0.1 degree of glide path. Designed for location on the carrier deck, the Rainbow is strictly an optical-geometrical system requiring no electronics or external inputs. The experimental unit has been used at ranges up to 3.5 miles in bright sunlight, weighs less than 50 pounds, and cost less than $1,000. (Author)

AD-611 571 Div. 1, 19
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
DESIGN EQUATIONS FOR RAINBOW OPTICAL LANDING AID.
Interim rept.,
by Carol A. Roberts. 5 Feb 65, 19p
Rept. no. NRL-6199
Proj. RS11 50 016 652 1F012 06 02
Unclassified report

See also AD-611 570.

Descriptors: (*Landing aids, Optical equipment), (*Night landings, Carrier landings), (*Display systems, Mathematical analysis), Equations, Design, Aviation safety, Guidance, Flight paths, Glide path systems, Colors, Errors, Geometry, Aircraft carriers.

The Rainbow Optical Landing Aid is a carrier-based landing display system which enables the pilot to control the rate of descent of his aircraft to a high level of accuracy. The system is purely optical-geometrical and requires no electronics. The command signal is presented as a color-coded array of lights, which is achieved by mounting color transparencies of exponential curves on a revolving transparent drum and by projecting the resultant pattern into space. The report is concerned with the color pattern on the revolving drum of the Rainbow optical landing display, including both the basic mathematical aspects of this pattern and its color coding. (Author)

AD-611 581 Div. 1
CFSTI Prices: HC$7.00 MF$2.00

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CATEGORY II ARCTIC EVALUATION OF THE YCH-47A HELICOPTER.
Rept. for 10 Dec 63-6 Feb 64,
by Ronald E. Stanford and D. Bruce Griggs. Dec 64, 389p ASD-TDR-64-86 Unclassified report

Descriptors: (*Helicopters, Cold weather tests), Performance (Engineering), Flight testing, Arctic regions, Military requirements, Rotor blades (Rotary wings), Drives, Hydraulic systems, Electrical equipment, Flight control systems, Heating, Maintainability, Handling, Taxiing.

The YCH-47A helicopter was tested under arctic conditions at Eielson AFB, Alaska during the period 10 December 1963 to 6 February 1964. Testing consisted of flights both at moderately low (+ 10F to -20F) and very low temperatures (-20F to -30F) as well as ground operation down to -40F. Along with conducting an overall evaluation of the helicopter's effectiveness in a cold environment, a number of improvements to correct earlier low temperature deficiencies were tested and found adequate. This report contains a description of the test procedures, selected instrumentation data, a discussion of the deficiencies uncovered and recommendations for their correction. Problems encountered in the Arctic were instability arising from SAS (Stability Augmentation System) operation, delamination of rotor blade fiberglass skins, and extreme difficulty in ground handling on hard packed snow, ice, or similar slippery surfaces. In order for the helicopter to be suitable for low temperature operation, new or modified rotor blades with assured structural integrity must be incorporated along with other improvements recommended in this report. (Author)

AD-611 770 Div. 1, 19
CFSTI Prices: HC$4.00 MF$1.00

Sierra Research Corp., Buffalo, N. Y.
ECONOMIC ANALYSIS COMMERCIAL HELICOPTER IFR OPERATIONS.
Final rept.
14 Feb 64, 122p Rept. no. TR-0384
Contract FA WA4321, Proj. 115 6R
FAA RD-64-18
Unclassified report

Descriptors: (*Civil aviation, Helicopters), (*Helicopters, Civil aviation), (*Instrument flight, Costs), Pilots, Scheduling, Operations research, Feasibility studies, All-weather aviation, Air traffic control systems, Navigation, Economics, Analysis, Vertical take-off planes, Terrain, Meteorology, Graphics.

The report describes the results of a detailed study which was conducted to determine the potential economic effects of helicopter IFR operations on the scheduled and non-scheduled helicopter operators, considering all pertinent factors; and it is concluded that: (1) Scheduled helicopter operators would gain potential economic benefit from an IFR capability in varying degrees, dependent on locale and types of equipment operated. (2) Generally, non-scheduled operators would gain no economic benefit from an IFR capability, at present, because of the types of equipment operated and services performed. (3) An IFR capability, alone, will not substantially alter the subsidy situation of the scheduled helicopter operator. (Author)

AD-611 816 Div. 1, 2
CFSTI Prices: HC$6.00 MF$1.25

Travelers Research Center, Inc., Hartford, Conn.
INITIAL IMPLEMENTATION TESTS OF WEATHER SUPPORT TO THE NATIONAL AIRSPACE SYSTEM.
Final rept.,
by Lawrence J. Reed. Dec 64, 203p
Contract FA WA4644, Proj. 206 1R
SRDS RD-64-147
Unclassified report

Descriptors: (*Weather forecasting, Data processing

systems), (*Data processing systems, Weather forecasting), (*All-weather aviation, Weather forecasting), Meteorological parameters, Statistical analysis, Programming (Computers), Weather communications, Digital computers, Systems engineering, Tests.

The initial phases of a quasi-real-time test of the use of computer programs employing modern weather techniques, reported here, examined their performance under operational conditions. Criteria were: estimates of feasibility, meteorological accuracy, and timeliness. Analyses and forecasts were prepared from live data. The results were not transmitted to aviation users. Two meteorological techniques were tested; (a) a statistical method for predicting ceiling and visibility up to seven hours, and (b) an analysis method based on elements reported from ground stations, e.g., ceiling, visibility, pressure, temperature, dew point, wind speed, and precipitation. The implementation of modern weather techniques is feasible. Many problems were met, none were insurmountable. Meteorological accuracy of the techniques could deteriorate significantly due to missing and/or erroneous data. Standardization and improvement of codes and communications discipline would help. Forecasts and analyses were ready for communications by 30 minutes after observation time. Significant improvement in timeliness can be achieved by utilizing real-time data channels, minimizing the use of magnetic tape in data processing, and rewriting new operational computer programs in lieu of re-programming developmental programs. (Author)

AD-611 825 Div. 1
CFSTI Prices: HC$2.00 MF$0.50

Litton Systems, Inc., St. Paul, Minn.
DETERMINATION OF THE SHAPE OF A FREE BALLOON. BALLOONS WITH SUPERPRESSURE, SUBPRESSURE AND CIRCUMFERENTIAL STRESS: AND CAPPED BALLOONS,
by Justin H. Smalley. 22 Apr 64, 42p
Rept. no. 2560, Scientific rept. no. SR-3
Contract AF19 628 2783, Proj. 6665, Task 666501
AFCRL 65-72

Unclassified report

See also AD-610 125.

Descriptors: (*Balloons, Geometric Forms), Stresses, Pressure, Configuration, Inflatable structures, Aerodynamic loading, Aerodynamic characteristics, Numerical methods and procedures.

Results of the computation of the shape of an axisymmetric free balloon are presented. Flat-top balloons with superpressure, with subpressure, and balloons with circumferential stress are considered. Circumferential stress is both held constant and varied as a function of meridional stress. Certain limitations on circumferential stress are noted. Shapes, meridional stresses, and circumferential stresses are presented. In addition, similar results are presented for capped balloons with a double-weight cap covering the upper half of the balloon. (Author)

AD-612 007 Div. 1
CFSTI Prices: HC$3.00 MF$0.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
REPRESENTATION OF PROPELLER WAKES BY SYSTEMS OF FINITE CORE VORTICES.
Summary rept. for Feb 63-Dec 64,
by W. Gordon Brady and Peter Crimi. Feb 65, 74p
Rept. no. CAL-BB-1665-S-2
Contract Nonr369100, Projs. RR011 05, NR215 004

Unclassified report

Descriptors: (*Propellers (Aerial), Wake), (*Wake, Simulation), (*Vortices, Wake), Rotary wings, Aerodynamic configurations, Aerodynamic characteristics, Aerodynamic loading, Mathematical models, Numerical analysis, Flight, Velocity, Distribution.

The report discusses the development of a propeller wake model and computational procedure aimed at the determination of the spatial distribution of wake vorticity and the associated induced velocity distribution. Numerical calculations were made for a number of vortex-ring configurations corresponding to a hovering rotor at one-half, one and two ring radii above the ground, as well as out-of-ground effect. Both unsteady and time-averaged velocities were computed at various points in the wake for several cases. A model is proposed for the wake flow of a rotor in steady forward flight. Instead of the vortex-ring representation, the tip vortices are represented by continuous finite-core vortices. For purposes of numerical calculation, the continuous vortex is approximated by short straight-line segments. This model will enable the calculation of the time-dependent wake-vortex configuration, within the limitations of practicable computing running time, in which the various vortex elements move under mutual influence according to the laws of vortex dynamics. (Author)

AD-612 011 Div. 1
CFSTI Prices: HC$3.00 MF$0.75

Lockheed-California Co., Burbank, Calif.
WIND TUNNEL TESTS OF AN OPTIMIZED, MATCHED-STIFFNESS RIGID ROTOR,
Nov 64, 64p Rept. no. Lockheed 17790
Contract DA44 177AMC78T, Proj. 1D121401A142
TRECOM TR-64-56

Unclassified report

Descriptors: (*Rotary wings, Model tests), (*Rotor blades, (Rotary wings), Model tests), Aerodynamic configurations, Torque, Trailing control surfaces, Force (Mechanics), Wind tunnels, Aerodynamic loading, Subsonic flow, Physical properties, Design, Simulation, Graphics.

A 10-foot-diameter model of a new type of rigid rotor was tested in the Freon atmosphere of a transonic dynamics tunnel at simulated speeds up to 263 miles per hour. Configurations having 3, 4, and 6 blades with zero blade twist and a 4-blade configuration with six degrees of negative twist were tested. A flexure system eliminated the usual feathering bearings. While a true matched stiffness rotor would have flapping and in-plane stiffness matched along the full length of the blade, the system tested had stiffness matched only in the blade flexure region. The tests were successful, and this new type of rigid rotor appears to offer substantial advantages over previous stiff in-plane rigid rotors by reducing: rotor weight, gyro weight and drag, hub drag, control forces, and mechanical complexity. (Author)

AD-612 023 Div. 1, 2, 15
CFSTI Prices: HC$3.00 MF$0.75

Dayton Univ., Ohio. Research Inst.
ERROR ANALYSIS AND COMPUTATIONS OF WIND SPEED AND WIND DIRECTION FROM AIRCRAFT DOPPLER DATA.
Scientific rept. no. 1,
by Marie Durling, Nicholas Engler, and Donald Kahle.
Aug 64, 66p
Contract AF19 628 2402, Proj. 8604, Task 7860402
AFCRL 64-703

Unclassified report

Descriptors: (*Wind, Flight speeds), (*Airspeed,

Errors), (*Groundspeed, Errors), Doppler effect, Drift, Mathematical analysis, Trigonometry, Wind-direction indicators, High altitude, Reconnaissance planes.

The use of a piloted aircraft to determine the magnitude and direction of the wind speed vector involves the direct measurement and recording of several basic parameters, such as ground speed, drift angle and air speed from which the wind speed vector is computed trigonometrically. This paper describes the significant mathematical relationships among these basic parameters, their errors and the resultant errors in wind speed and wind direction. After development of the general error equations, examples are given using Aircraft APN 102 Doppler data from typical flights made by a high altitude reconnaissance aircraft. (Author)

AD-612 072 Div. 1, 27
CFSTI Prices: HC$3.00 MF$0.75

Douglas Aircraft Co., Inc., Long Beach, Calif.
CRUISE CONTROL OF TURBOJET AIRCRAFT.
Revised ed.,
by C. G. Livingston. 5 Feb 65, 77p Rept. no. LB-31183A
Contract Nonr1076 00
AD 296 530 superseded

Unclassified report

Revision of rept. dated 21 Jan 63.

Descriptors: (*Turbojet engines, Flight paths), (*Flight paths, Control systems), (*Display systems, Turbojet engines), Jet propulsion, Optimization, Drag, Fuel consumption, Wind, Automatic pilots, Mathematical analysis, Operations research, Energy management.

A general technique is presented for cruise control of turbojet powered aircraft. The technique is evolved through the effects of imposed constraints and external forces to an integrated display system that will enable the pilot to optimize cruise management under all realistic conditions. Requirements are defined and the preliminary effort necessary for the commencement of a program for development of the total system is completed.

AD-612 181 Div. 1, 9, 23
CFSTI Prices: HC$8.05 MF$2.50

Air Force Flight Test Center, Edwards AFB, Calif.
AERODYNAMICS HANDBOOK FOR PERFORMANCE FLIGHT TESTING, VOLUME I.
Jul 60, 503p Rept. no. AFFTC TN-60-28

Unclassified report

Prepared in cooperation with USAF Experimental Flight Test Pilot School, Edwards AFB, Calif.

Descriptors: (*Aerodynamic characteristics, Handbooks), (*Flight testing, Handbooks), Pilots, Students, Education, Aircraft, Drag, Airfoils, Acceleration, Performance (Engineering), Aerodynamic loading, Thermodynamics, Fluid mechanics, Atmosphere, Propellers (Aerial), Jet engines, Aircraft engines, Flight, Instrumentation, Climbing, Descent, Theory.

Contents:
Fundamental review
Basic aerodynamic summary
Performance
Power plants
Instrumentation.

AD-612 184 Div. 1
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
A WIND-TUNNEL INVESTIGATION OF SOME SHORT-CHORD LOW-SOLIDITY SHROUDED PROPELLERS IN THE CRUISE CONDITION,
by William B. Maguire. Nov 64, 31p
Rept. nos. 1919, Aero-1083

Unclassified report

Descriptors: (*Shrouded propellers, Performance (Engineering)), (*Shroud rings, Aerodynamic characteristics), Flight, Model tests, Configuration, Thrust, Airfoils, Pitch (Motion), Moments, Pressure, Drag, Lift, Vertical take-off planes, Short take-off planes, Wind tunnels, Experimental data.

Two basic shrouds were investigated, each with a two- and a three-bladed propeller. Performance data in pitch were obtained. The report contains the results of the investigation, and includes information pertaining to the cruise performance of two powered shrouded propeller configurations with nominal length-to-diameter ratios of 0.1 and 0.2. Propulsive efficiencies in excess of eighty percent were obtained at thrust coefficients as low as 0.07. (Author)

AD-612 257 Div. 1, 14, 17, 26
CFSTI Prices: HC$3.00 MF$0.75

Battelle Memorial Inst., Columbus, Ohio
THE STUDY OF SLEEVE BEARINGS IN AIRCRAFT SUPPORT STRUCTURES. THE DEVELOPMENT OF DESIGN DATA FOR MIL-HDBK-5 CONCERNING AIRFRAME BEARINGS.
Summary rept.,
by W. A. Glaeser, D. W. Nicholson, and C. M. Allen.
27 Aug 62, 65p
Contract NOw60 0496C

Unclassified report

Descriptors: (*Journal bearings, Airframe bearings), (*Airframe bearings, Journal bearings), Surfaces, Steel, Aluminum alloys, Bronze, Halocarbon plastics, Metals, Impregnation, Composite materials, Molybdenum compounds, Sulfides, Coatings, Friction, Lubricants, Lubrication, Temperature, Loading mechanics.

The performance of steel shafts oscillating in bearing surfaces of aluminum bronze, Teflon-impregnated metal, Teflon woven fabric, MoS2 coatings, and high-strength steels have been determined experimentally. The parameters studied include bearing load, wear, coefficient of friction, lubricants, and ambient temperature. Two bearing designs were used. One oscillation amplitude and frequency was used. The data of the aluminum bronze bearing evaluations have been rearranged in design-chart forms intended for use by bearing designers. Coefficient of friction values and wear data for various other lubricants and conditions are also presented. (Author)

AD-612 366 Div. 1, 2
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ATMOSPHERIC TURBULENCE AND THE STABILITY OF FLIGHTS IN ZONE OF TROPOPAUSE AND JET STREAMS,
by N. F. Gel'mgol'ts. 23 Feb 65, 45p
FTD-MT-64-297
TT 65-61808

Unclassified report

Edited machine trans. of Gidrometeorologicheskii Institut, Leningrad. Trudy (USSR) 1963, no. 19, p. 3-30.

Descriptors: (*Atmospheric motion, Aeronautics), (*All-weather aviation, Flight paths), (*Buffeting, Aircraft), (*Aeronautics, Atmospheric motion), Atmospheric sounding, Meteorology, USSR, Tropopause, Jet streams (Meteorology).

In the article an analysis is made of atmospheric turbulence, experienced by an aircraft both as bumps and bumpy air. There is ascertained the general conditions and distribution of turbulence aloft, the relationship between prevailing and maximum overloads affecting an aircraft, and the frequency of overloads there is investigated dependence of turbulence on geographic conditions on the stratification, type and slope of tropopause, wind speeds and jet streams, synoptic situation, and cloudiness. Flights of IL-28 sounding aircraft are used in regions of southeastern Kazakhstan. The range of the investigated heights is 8 to 12 km. (Author)

AD-612 412 Div. 1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
GYROSCOPIC SYSTEM WITH CANTED ROTORS AND TWO DEGREES OF FREEDOM,
by V. V. Maksimov. 9 Mar 65, 12p
FTD-TT-64-856
TT 65-61821 Unclassified report

Unedited rough draft trans. of Aviatsionnyi Institut, Kazan. Trudy (USSR) 1963, v. 75, p. 61-69.

Descriptors: (*Flight instruments, Gyroscopes), (*Gyroscopes, Tachometers), (*Tachometers, Gyroscopes), Attitude indicators, Vector analysis, Moments, USSR.

A description of a gyro system with two degrees of freedom, and with inclined rotors, which possesses the property of stabilizing itself in an identical way around the axis of revolution of the base as an ordinary gyroscope with two degrees of freedom. The individual movability of each of the gyroscopes on a common base with the presence of its inclinations changing with regard to the axis of rotation. The sign of the value of the measurable angular velocity is taken from one gyroscope. The second gyroscope can be used as a pickup of the angular velocity in the systems of stabilization and automatic control of flying apparatuses or as a cutout of the correction of the gyro instruments. The setting of the pointer on the indicated gyroscopes assures the observation of the position of the axis and the direction of revolution. The instrument will measure the resulting angular valocity of all revolutions the vectors of which line in the plane YOZ. (Author)

2. Astronomy, Geophysics and Geography

AD-611 476 Div. 2

Marine Physical Lab., Univ. of California, San Diego.
METHOD USING ELLIPSES TO INTERPRET SEISMIC REFLECTION DATA,
by Gary S. Gassaway. 12 Jun 64, 11p MPL-U-33/64
Contract Nonr221605

Unclassified report

Pub. in Geophysics (U. S.) v29 n6 p926-34 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismology, Numerical methods and procedures), Seismic waves, Reflection, Mapping, Analytic geometry, Acoustic equipment, Geophysics.

This article describes a novel method of exploration by seismic reflection which involves an areal distribution of geophones and a graphical method of interpretation particularly well suited to regions of complex structure involving faulting and steeply dipping beds. It is an expansion of a paper presented to the Rocky Mountain Section of the Geological Society of America meetings in May, 1963. That paper showed how some properties of an ellipse can be used to interpret complex structures by using seismic reflection data with the assumption that the velocity of a seismic wave is constant below the weathered layer. The method is expanded here to account for the effect of velocity versus depth on the ray path to determine the depth, dip, and strike of reflecting surfaces every 200 ft of traverse for each reflector. A method of finding the error of closure between two ray paths to each point of reflection is developed. This information may be determined regardless of the shape or attitude of the reflecting surfaces.

AD-611 479 Div. 2

Norwegian Inst. of Cosmic Physics.
EXCITATION OF A10 BANDS IN THE SUNLIT ATMOSPHERE AND THE DETERMINATION OF THE TEMPERATURE FROM THE DISTRIBUTION AMONG THE VIBRATIONAL LEVELS.
Scientific rept. no. 6,
by O. Harang. 1 Jan 64, 8p
Contract AF61 052 680
AFCRL 65-57

Unclassified report

Pub. in Planetary and Space Science (U. S.) v12 p567-71 1964 (Copies available only to DDC users)
Prepared in cooperation with Oslo Univ. (Norway)
See also AD-444 683.

Descriptors: (*Twilight, Solar spectrum), (*Solar spectrum, Twilight), TNT, Explosions, Atmosphere, Clouds, Luminescence, Emissivity, Excitation, Atomic energy levels, Atmospheric temperature, Band spectrum, Solar radiation, Geophysics, Norway.

A study of the emission from a luminous cloud produced by a TNT explosion suggests that the temperature in the 200-220 km region of the twilight atmosphere is about 1250K or rather less. (Author)

AD-611 515 Div. 2, 25

Palomar Observatory, Pasadena, Calif.
AN ABUNDANCE ANALYSIS OF 3 CENTAURI A,
by Jun Jugaku, Wallace L. W. Sargent, and Jesse L. Greenstein. 12 Jun 61, 14p
Contract AF49 638 21
AFOSR 871

Unclassified report

Pub. in Astrophysical Journal (U. S.) v134 n3 p783-96 Nov 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stars, Atomic spectroscopy), (*Atomic spectroscopy, Stars), Astrophysics, Spectra (Visible and ultraviolet), Abundance, Helium, Hydrogen, Deuterium, Oxygen, Nitrogen, Sulfur, Iron, Krypton, Gallium, Magnetic fields, Ions, Binary stars.

Abundances in 3 Centauri A (B4 IV or Vp) are derived, using gamma Pegasi (B2 IV) as a standard comparison star and the approximation of a single-layer atmosphere. The abundances of certain elements (P, Ca, Ga, and Kr) not observed or observed only weakly in gamma Pegasi are derived relative to Si in 3 Centauri A. We find that C, Ne, Si, A, and Ca have normal abundances. He and O are underabundant by a factor of 6 in 3 Centauri A; N is overabundant by a factor of 5; P by a factor of 100; Fe by a factor of 4; and Kr by a factor of about 1300. An identification of Ga II which is not yet certain leads to an overabundance of about 8000 for Ga. We derive upper limits for the abundances of Al, S, Cl, Zn, Ge, As, Se, Br, Rb, and Sr. Of these, S is deficient by a factor of more than about 10. It is likely that Ga and Kr are local abundance peaks but that other elements in the same region of the periodic table could be almost as overabundant without being detected spectroscopically. It is conjectured that these abundance anomalies, together with the large concentration of He3 reported previously, have been produced by the acceleration of particles on the surface of 3 Cen A. H. W. Babcock has not detected a regular magnetic field in the star, although it is probably related to the 'manganese' stars which have magnetic fields. (Author)

AD-611 516 Div. 2, 25

Palomar Observatory, Pasadena, Calif.
EFFECTIVE TEMPERATURES OF F-TYPE STARS USING H GAMMA LINE PROFILES,
by Leonard Searle and J. B. Oke. 11 Nov 61, 13p
Contract AF49 638 21
AFOSR 1740

Unclassified report

Pub. in Astrophysical Journal (U. S.) v135 n3 p790-801 May 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stars, Temperature), (*Line spectrum, Hydrogen), Luminescence, Gravity, Astrophysics, Variable stars, Metals, Abundance, Atomic spectroscopy.

Line profiles for the hydrogen line H gamma have been computed for a range of effective temperatures and gravities corresponding to those of F-type stars of different luminosity classes. These have been compared with observed profiles for (a) the cluster-type variables RR Lyrae and SU Draconis, (b) two F-type subdwarfs, and (c) the F-type stars with metal lines of normal strength-nu Herculis, eta Aquilae, and delta Cephei. For the first two groups of stars, the metal lines are weak, and the continuum can be drawn unambiguously. The observed and computed profiles are in excellent agreement, and the line profiles can be used as reddening-independent temperature indicators. A comparison of these H gamma temperatures with those determined by fitting observed absolute energy distributions to fluxes computed from model atmospheres shows

satisfactory agreement, provided that one allows for interstellar reddening. For the third group of stars, which have strong metallic lines, the evidence is strong that no true continuum is observed. The depression of the continuum is small enough in nu Herculis (F2 II) that an estimate of the effective temperature can still be made by fitting the observed H gamma profile to those computed. At spectral types F5 or later, the continuum is depressed to such an extent that a temperature determination by H gamma fitting is not possible. (Author)

AD-611 530 Div. 2, 6, 19
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF UNAMBIGUOUS MEASURING THE DISTANCE BETWEEN AN AIRCRAFT AND TWO OR MORE GROUND RESPONDER-STATIONS AND THE DEVICE FOR REALIZATION OF THIS METHOD,
by I. L. Gil'. 11 Feb 65, 15p FTD-TT-64-942
TT 65-61775

Unclassified report

Unedited rough draft trans. of Russian patent 160,838, appl. no. 766,622/40-23, 27 Feb 62.

Descriptors: (*Range finding, Radio equipment), USSR, Airborne, Radio receivers, Transponders, Cathode ray tubes, Photographic recording systems, Ultrahigh frequency, Radio signals, Radiofrequency generators, Demodulators, Curve fitting, Aerial photography, Geodesics, Surveying.

In the aircraft multichannel receiver, the signals from the ground transponders are divided by one heterodyne signal from the generator of an UHF-transmitter. The different frequency pulses separated from the output of detectors of each receiver channel are fed to one pulse mixer to activate the CRT scanner, and the difference in frequency of low frequency sinusoidal oscillations separated also from the output of detectors are transformed into pulses and are fed together with the output pulses of the mixer to another pulse mixer to obtain on CRT screen an image of the measuring brightness markers. Indications from the screen are continuously photographed on a moving photo film of photo recorder. The total distance is determined by the disruption in curve recording of continuously changing distances, forming at the moment of switching over the oscillation frequencies, modulating the carrier frequencies of signals coming from aircraft station and responders.

AD-611 551 Div. 2, 4, 30
CFSTI Prices: HC$2.00 MF$0.50

Atomics International, Canoga Park, Calif.
DETERMINATION OF NITROGEN AND OXYGEN ATOMS IN THE UPPER ATMOSPHERE.
Final rept. for May-Nov 64,
by J. Greyson and R. T. Keen. 1 Dec 64, 40p
Rept. no. AI-65-27
Contract AF19 628 4056, Proj. 6687, Task 668701
AFCRL 64-990

Unclassified report

Descriptors: (*Upper atmosphere, Samplers), (*Oxygen, Upper atmosphere), (*Nitrogen, Upper atmosphere), (*Styrene plastics, Samplers), (*Samplers, Feasibility studies), Gels, Expanded plastics, Free radicals, Nuclear paramagnetic resonance, Absorption spectrum, Quantitative analysis, Reaction kinetics.

Freeze dried polystyrene aerogels or fluffs, when reacted with gaseous atoms, yield stable, free radical products at concentration levels dependent upon the concentration of the reacting atoms. These reactions, as applied to oxygen and nitrogen atoms, were investigated to determine the feasibility of their use as a means of atom sampling in the upper atmosphere. Electron paramagnetic resonance spectroscopy was used for qualitative and quantitative product analysis. The results of the preliminary investigation revealed that about 1% of the atoms passing through the fluff were captured. Measurements of lifetimes showed that about 1000 minutes were required for decay to half a starting product concentration. Such reaction efficiencies and product lifetimes are sufficient for upper atmosphere sampling and remote measurement. Oxygen atoms are in excess over nitrogen by one to three orders of magnitude. The reaction rates of both atom species with fluff are similar resulting in negligibly small interference from N atoms during oxygen atom measurements. (Author)

AD-611 562 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Tufts Univ., Medford, Mass. Dept. of Geology.
Th230/U234 DATES OF LATE PLEISTOCENE MARINE FOSSILS FROM THE MEDITERRANEAN AND MOROCCAN LITTORALS.
Final technical rept. for 15 Dec 63-15 Dec 64,
by Charles E. Stearns and David L. Thurber.
1 Feb 65, 28p
Grant Nonr G00043 63, Proj. NR388 076

Unclassified report

Descriptors: (*Geologic age determination, Paleontology), (*Paleontology, Aquatic animals), Mediterranean Sea, Morocco, Seacoast, Thorium, Uranium, Isotopes, Half life, Mollusca, Marine geology.

Apparent ages of fossil molluscs based on Th230/U234 ratios show sufficient internal consistency and agreement with independent evidence of age to justify exploration of their usefulness. Preliminary results from samples from Mediterranean and Moroccan littorals suggest (1) that the Anfatian stage of Morocco and the first appearance of Strombus bubonius in the Mediterranean are both >300,000 years old, (2) that sea level stood high between 140,000 and 125,000 years B.P., and (3) that several Tyrrhenian deposits and the Ouljian stage of Morocco record a non-glacial interval of high sea level 75,000-90,000 years B.P. Internal consistency in the results reported here, and correspondence with other estimates of the absolute age of times of high sea level, lend credibility to the absolute ages derived from Th230/U234 ratios. (Author)

AD-611 584 Div. 2
CFSTI Prices: HC$4.00 MF$1.00

United Aircraft Corp., East Hartford, Conn.
DIAGNOSIS OF SURFACE WEATHER CONDITIONS FROM OBSERVED AND PROGNOSTIC UPPER-AIR PARAMETERS.
Technical rept. for Oct 63-Dec 64,
by Russell G. Harris, Joseph G. Bryan, and James E. MacMonegle. Feb 65, 147p
Contract AF19 628 3437, Proj. 3, Task 3 4
ESD TR-65-2

Unclassified report

Subcontracted to Travelers Research Center, Inc., Hartford, Conn., pub. no. 7463-156.

Descriptors: (*Weather forecasting, Statistical analysis), (*Meteorological parameters, Weather forecasting), (*Statistical analysis, Weather forecasting), Dynamic programming, Upper atmosphere, Ceiling, Rainfall, Climatology, Meteorological charts, Tables.

Objective techniques are being developed for interpreting grid-point analyses and prognoses produced by computerized dynamical models in terms of concomitant surface-weather conditions. Multiple regression equations were derived to express statistical relationships between surface-weather variables and derived upper-air parameters representing pertinent physical processes taking place between the surface and the 500-mb level. These upper-air (predictor) parameters were derived from observed height and thickness values and the climatological statistics of these values. The work presently being conducted and plans for future work are discussed. Improvement is being sought by the definition of better predictor parameters to represent orographic effects and by the incorporation of moisture (cloud amount) information now available from dynamical models. The equations will be tested on real-time upper-air prognoses and readied for use in an operational test by the Air Weather Service by September 1965. (Author)

AD-611 585 Div. 2
CFSTI Prices: HC$4.00 MF$0.75

United Aircraft Corp., East Hartford, Conn.
A PHYSICAL MODEL FOR THE PREDICTION OF LARGE-SCALE LOW CLOUDINESS.
Technical rept. for May-Dec 64,
by Joseph P. Gerrity, Jr. Feb 65, 114p
Contract AF19 628 3437, Proj. 1 0, Task 1 2
ESD TR-65-3

Unclassified report

Subcontracted to Travelers Research Center, Inc., Hartford, Conn., pub. no. 7463-150.

Descriptors: (*Cloud cover, Mathematical prediction), (*Weather forecasting, Cloud cover), Atmosphere, Boundary layer, Meteorological parameters, Mathematical models, Meteorological charts, Tables.

This paper is a report on a continuing effort to develop a physical-numerical model suitable for use in predicting large-scale fields of low cloudiness. Included are a derivation of a basic prediction model and the results of a test series of 12-hr forecasts made with various versions of the model using synoptic data for the period: 12Z, 6 Feb.--00Z, 7 Feb. 1964. The tests were designed to assess the characteristics of the model and to indicate areas in which more study is required. The model tested differs broadly from previous boundary layer models in its use of all three space dimensions, a horizontal space mesh of 150 km, and a time step of 15 min. The model incorporates the computation of: eddy fluxes of heat and vapor, the transport of heat, vapor, etc. by ageostrophic horizontal winds, the influence of terrain- and friction-induced vertical motion, and the heat and mass exchanges involved in water-substance phase changes.

AD-611 617 Div. 2

National Research Council of Canada, Ottawa, (Ontario). Div. of Applied Physics.
SOME THOUGHTS ON AUTOMATION IN PHOTOGRAMMETRY,
by U. V. Helava. 1964, 7p Rept. no. NRC-8132

Unclassified report

Pub. in Canadian Surveyor v18 n5 p399-405 Dec 1964
(Copies available only to DDC users).

Descriptors: (*Photogrammetry, Automation), Computers, Cathode ray tubes, Scanning, Plotters, Photographs, Canada.

The efforts to make photogrammetric mapping automatic have produced many ingenious devices but, as a whole, have resulted in only a limited improvement in the 'output per dollar' figure. An examination of various existing and proposed solutions shows that the most serious obstacle to the development of economically justifiable automatic mapping systems is the relatively slow speed at which the sensor systems of the automatic plotter can scan the photographs while maintaining an adequate accuracy level. Use of a flying spot scanner with a monitoring system is proposed as one possible solution to the problem of fast and accurate scanning. (Author)

AD-611 628 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Yerkes Observatory, Williams Bay, Wis.
STUDIES IN GALACTIC ASTRONOMY, INCLUDING MAGNETIC FIELDS.
Final rept. for 1 Nov 58-31 Oct 63,
by W. A. Hiltner. 19 Nov 63, 14p
Contract AF19 604 4955, Proj. 8635, Task 863501
AFCRL 64-153

Unclassified report

Descriptors: (*Astronomy, Galaxies), (*Galaxies, Bibliographies), (*Bibliographies, Galaxies), Novae, Interstellar matter, Magnetic fields, Polarization, Stars, Stability, Energy, Distribution, Optical properties, Celestial mechanics.

Many aspects of galactic astronomy have been investigated leading to 39 publications, principaly in the Astrophysical Journal starting in volume 130 (1959) and ending with volume 141 (1965). The publications include research on Nova DQ Herculis, the polarization of the jet in M87, Galactic Clusters NGC457, 2281, 2539, 2548, 7654 and 654, classical cepheids in both the northern and southern hemispheres, the classification of galaxies and clusters, motions in barred galaxies, and dynamical stability of clusters of galaxies, theoretical work on the initial luminosity function, the Wolf-Rayet phenomenon, both observationally and theoretically, dynamics of galactic clusters and colliding galaxies, interstellar reddening, observational techniques in photometry, effects of a magnetic field on instability and energy distribution in early type stars. (Author)

AD-611 629 Div. 2, 12, 22
CFSTI Prices: HC$4.00 MF$1.00

American Science and Engineering, Inc., Cambridge, Mass.
A RESEARCH PROGRAM TO INVESTIGATE ARTIFICIALLY INJECTED TRAPPED RADIATION.
Final rept.,
by R. Giacconi, F. R. Paolini, W. C. Hadley, and R. Talbot, Jr. 30 Oct 64, 148p ASE-759
Contract AF19 628 2799, Proj. 8600, Task 860006
AFCRL 64-917

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Upper atmosphere, Charged particles), (*Nuclear particles, Upper atmosphere), (*Air pollution, Radiation measurement systems), (*Nuclear explosions, High altitude), Radiological contamination, Radiation

hazards, Van Allen radiation belt, Satellites (Artificial), Space environmental conditions, Terrestrial magnetism, Scintillation counters, Simulation, Data processing systems, Digital computers, Energy, Distribution, Intensity, Calibration.

The document describes an experimental research program to measure the intensity, angular distribution, and energy spectra of particles trapped in the Earth's magnetic field. Particular attention was focused on the measurement of particles artificially injected by high altitude nuclear detonations during the series of nuclear tests conducted by the USSR and the USA during the summer and fall of 1962. A detailed description of the instrumentation and calibration procedures are given. Measurements obtained by instrumentation identical to the one described, flown on an Air Force satellite, are given. The method of data handling is discussed and machine programs for data reduction are described. Results from these measurements have appeared in several documents, a listing of which is included in the test. A summary of the results and conclusions is given. (Author)

AD-611 638 Div. 2, 25

High Altitude Observatory, Boulder, Colo.
SCATTERED LIGHT IN AN EXTERNALLY OCCULTED CORONAGRAPH,
by Gordon Newkirk, Jr. and David Bohlin. 22 Nov 63, 1p
Contract NONR39305

Unclassified report

Pub. in Applied Optics (U. S.) v3 n4 p543 Apr 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Solar radiation, Scattering), (*Solar corona, Astronomical data), (*Astronomical data, Solar corona), Optical equipment.

AD-611 640 Div. 2, 25

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
NATURE OF SPONTANEOUS OSCILLATIONS IN A CESIUM DIODE ENERGY CONVERTER,
by W. T. Norris. 12 May 64, 9p
Contracts DA36 039AMC03200E, AF33 616 7624

Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n11 p3260-8 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasma oscillations, Cesium electron tubes), (*Differential equations, Plasma oscillations), (*Cesium electron tubes, Plasma oscillations), Electrons, Ions, Stability, Diodes, Energy conversion, Mathematical models.

In an attempt to understand the nature of the oscillations that are observed in plasma diodes the usual collision-free model is examined. The equations describing the model are simplified by neglecting the time-dependent term in the Boltzmann equation for the electrons. Even this simplification does not readily yield quantitative predictions about the frequency or form of the oscillations, or even about the conditions under which they are likely to occur. However we introduce a criterion of stability which allows us to predict a possible instability in the steady-state condition which arises because the electrons can redistribute their charge more rapidly than the ions. The simplified equations and the criterion together lead to a good qualitative and a partial quantitative understanding of a particular case. The particular case can be regarded as the epitome of the general case, and the arguments used in it seem capable of the necessary extension to cover all instances of this sort of spontaneous oscillation. (Author)

AD-611 649 Div. 2

High Altitude Observatory, Boulder, Colo.
THE FIRST FLIGHT OF CORONASCOPE II,
by Gordon Newkirk, Jr. and J. David Bohlin.
1964, 4p
Contract Nonr39305

Unclassified report

Pub. in Sky and Telescope (U. S.) v28 n1 p1-4 Jul 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Solar corona, Photography), (*Telescopes, Airborne), Balloons, Astrophysics, Sun, Optical scanning, Astronomical data.

Extended observation of the intermediate corona is the ultimate purpose of Coronascope II. This project uses an unmanned stratospheric balloon to raise a coronagraph above the dust and smoke of the lower atmosphere for several hours of continuous operation. At the end of the day's observation, the instrument and its photographs are returned to the ground by parachute.

AD-611 694 Div. 2, 30

Scripps Institution of Oceanography, Univ. of California, La Jolla.
PHYSICAL OCEANOGRAPHY: PLANS FOR U. S. - JAPAN COOPERATION,
by Margaret K. Robinson. 1965, 3p
Contract Nonr221623, Proj. NR083 005

Unclassified report

Pub. in Science (U. S.) v146 n3649 p1371-2 Dec 4 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oceanology, Pacific Ocean), Research program administration, Japan, United States, Oceanographic equipment, Telemeter systems.

Seven Japanese and seven American oceanographers participated in the planning meeting on physical oceanography of the Pacific Ocean, held in Tokyo, 18-23 March 1964. The first three days were devoted to the discussion of topics of direct interest and concern to the individual participants: (1) The preparation of historic, average, and synoptic charts of temperature at the sea surface and at selected subsurface depths in the Pacific Ocean; (2) the relation of thermal structure to ocean circulation, to distribution of mass, and to sea level fluctuation; (3) thermal structure in upwelling and frontal zones; (4) relationship between seasonal and permanent thermocline and the main pycnocline; (5) the air-sea energy exchange problem, and (6) theoretical studies of the above processes.

AD-611 695 Div. 2

Scripps Institution of Oceanography, Univ. of California, La Jolla.
SUBMARINE CANYONS AND SAGAMI TROUGH, EAST-CENTRAL HONSHU, JAPAN,
by Francis P. Shepard, Hiroshi Niino, and Theodore K. Chamberlain. 10 Sep 63, 18p
Contracts Nonr221623, Nonr221601, Proj. NR083 005

Unclassified report

Pub. in Geological Society of America Bulletin (U. S.) v75 p1117-30 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Marine geology, Japan), (*Japan, Marine geology), Seacoast, Pacific Ocean, Hydrographic surveying.

Two large and several small submarine canyons are found along the Japanese coast in the vicinity of Tokyo. The configuration of these canyons and the nature of their floors are compared to those of the large fault trough that extends seaward in Sagami Bay. All the canyons head in about 100 m of water and all terminate in the Sagami fault trough at depths of several hundred to about 2500 m. The character of the submarine canyons appears to have been greatly influenced by faulting and warping, processes that have determined the location of most of the canyons. However, the sinuous trend and dendritic pattern of tributaries suggest erosion, probably in part subaerial. The importance of tidal and/or planetary currents is indicated by the current ripples found on the floor of Mera Canyon directly beneath a great surface turbulence caused by the juncture of the Kuroshio and the tidal currents coming out of Tokyo Bay. (Author)

AD-611 724 Div. 2

Institute of Tech., Univ. of St. Louis, Mo.
THE DETERMINATION OF S-WAVE POLARIZATION ANGLES FOR AN EARTH MODEL WITH CRUSTAL LAYERING.
by Otto W. Nuttli. 2 May 64, 17p
Scientific rept. no. SR-5, Pub. no. 126,
Contract AF19 604 7399, Proj. 8652, ARPA order 180 61
Task 865201
AFCRL 64-981
Unclassified report

Rept. on Proj.
Pub. in Seismological Society of America. Bulletin (U.S.) v54 n5 ptA p1429-40 Oct 1964 (Copies not available to DDC of Clearinghouse customers).

Descriptors: (*Seismic waves, Polarization), (*Earth models, Seismology), Lithosphere, Structural geology, Geophysics, Seismological stations, Simulation, Graphics, Mathematical models.

This paper presents a method for determining the polarization angle of S waves which takes account of the crustal layering at the seismograph station. Charts are given for four crustal models, corresponding to normal continental, thick, and thin crusts, which enable one to obtain the polarization angle at the top of the mantle beneath the seismograph station. The equations to be used for obtaining the polarization angle are: tan epsilon = F sub h tan gamma, tan epsilon = F sub v tan delta where epsilon is the polarization angle, gamma is the angle between the horizontal component of the S-wave surface motion and the great circle path at the station, delta is the angle between the vertical axis and the component of the S-wave surface motion in the plane transverse to the great circle path, and F sub h and F sub v are functions of wave period, epicentral distance, and the crustal structure at the seismograph station. Values of F sub h and F sub v for four crustal models are given in the paper. (Author)

AD-611 727 Div. 2

Seismological Lab., Calif. Inst. of Tech., Pasadena.
MODE-RAY DUALITY,
by Ari Ben-Menahem. 20 May 64, 7p
Contribution no. 1260
Contract AF49 638 1337 Unclassified report

Pub. in Seismological Society of America. Bulletin (U.S.) v54 n5 ptA p1315-21 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismic waves, Propagation), Radio waves, Seismology, Boundary value problems, Transformations (Mathematics), Integral equations, Special functions (Mathematical), Geophysics, Lithosphere.

Earlier results in the theory of terrestrial radio waves are applied to seismology. A partial field of the complete eigen-value solution for a sphere can be interpreted as real rays. Watson's transformation and the WKBJ approximation are employed to establish links between the index trio (l, m, n) of a mode and the corresponding parameters of the ray trajectory associated with this mode. It is shown that Snell's law for rays and Jeans' formula are complementary. The condition of constructive interference is expressed as an integral equation for the eigen-frequencies sub n omega sub l. (Author)

AD-611 754 Div. 2, 30
CFSTI Prices: HC$2.00 MF$0.50

Northwestern Univ., Evanston, Ill.
A FORTRAN PROGRAM FOR COORDINATE MAPPING USING AN I.B.M. 7090 COMPUTER,
by Frank J. Rens. Feb 65, 33p
Technical rept. no. TR-10
Contract Nonr122826, Proj. NR389 135
Unclassified report

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Descriptors: (*Programming (Computers), Mapping), (*Mapping, Digital computers), (*Digital computers, Mapping), Maps, Production, Compilers, Control sequences, Data processing systems, Programming languages, Geography.

This is a detailed description of a computer program which will prepare maps on a high-speed printer in response to latitude and longitude coordinates. The maps produced can be of large size, at any reasonable scale, and on any map projection. The directions given in this write-up are such that an individual with little computer knowledge can use this program for mapping data. (Author)

AD-611 784 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Saint Louis Univ., Mo.
ATMOSPHERIC MICRO-OSCILLATIONS OCCURRING DURING TEMPERATURE INVERSIONS.
Master's thesis,
by William Andrew Beczkalo. 1965, 59p
Contract AF33 608 1115
Unclassified report

Descriptors: (*Microbarometric waves, Temperature inversion), (*Temperature inversion, Microbarometric waves), Atmosphere, Thermodynamics, Air mass analysis, Meteorological parameters, Atmospheric motion, Meteorological charts, Geophysics.

Investigation of short period air pressure micro-oscillations and their relation to synoptic weather patterns have been undertaken at Saint Louis University during the past twenty six years. The early investigators grouped the very short period oscillations (one through twenty seconds) into one class and attributed these to

either turbulence associated with large values of horizontal wind speed or convective activity. Within the past year a study was made of microbarographic data recorded at Florissant, Missouri subdividing this single classification of short period micro-oscillations and analyzing the periods in the one to ten second range associated with the passage of cold fronts.

AD-611 785 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Saint Louis Univ., Mo.
SOURCE REGION OF AIR IN VICINITY OF SQUALL LINE FORMATION. A DYNAMIC ANALYSIS USING POTENTIAL VORTICITY AND ISENTROPIC TRAJECTORIES.
Master's thesis,
by Rufus Daniel McCollum. 1965, 72p
Contract AF33 608 1115

Unclassified report rt

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Air mass analysis, Dynamic programming), Atmosphere, Thermodynamics, Geophysics, Meteorological parameters, Atmospheric motion, Storms, Meteorological charts.

The origin of air in the vicinity of a squall line that formed at 0600 GMT on November 16, 1960 was investigated in this study. The air was identified by values of potential vorticity and the conservative nature of this property was studied. High values of potential vorticity existed in the stratosphere while much smaller ones were typical of the troposphere. The source region of this air was determined by 12-hour air parcel trajectories. This study was conducted on a surface of constant potential temperature (isentropic surface) that sloped from the lower stratosphere over 16,000 feet into the troposphere. The potential temperature (O) surface equal to 315K was used throughout this study.

AD-611 808 Div. 2
CFSTI Prices: HC$6.00 MF$1.25

Cornell Univ., Ithaca, N. Y.
GEOTHERMAL STEAM: ORIGIN, CHARACTERISTICS, OCCURRENCE, AND EXPLOITATION.
Final rept.,
by George A. Kiersch. 14 Nov 64, 207p
Contract AF19 628 293, Proj. 8623, Task 862303
AFCRL 64-898

Unclassified report

Descriptors: (*Steam, Lithosphere), (*Thermodynamics, Geophysics), (*Lithosphere, Thermal properties), (*Geochemistry, Steam), Volcanoes, Seismology, Structural geology, Hydrology, Geophysical prospecting, Electric power production, Economic geology, Power supplies.

This project has investigated the following principal features of geothermal steam resources: (1) sources of heat; (2) sources of water; (3) importance of seismic activity, so commonly associated with volcanism, to the location and potential of geothermal resources; (4) manner in which geothermal energy is transferred from the deep-seated heat source to the near-surface reservoir site; (5) major geologic conditions governing the localization of geothermal energy and development of a large-scale reservoir; (6) exploration methods and techniques for locating and delineating areas of geothermal potential; (7) possible uses, both military and civilian, for geothermal energy; and (8) some areas throughout the world with potential for geothermal resources that have not been explored.

AD-611 828 Div. 2, 8
CFSTI Prices: HC$3.00 MF$0.75

Iowa State Univ., Iowa City.
ION CYCLOTRON WHISTLERS.
Doctoral thesis,
by D. A. Gurnett. Jun 65, 96p Rept. no. 65-2
Contracts N9onr93803, Nonr150906

Unclassified report

Descriptors: (*Whistlers, Cyclotron waves), (*Cyclotron waves, Whistlers), Ionosphere, Radio waves, Very low frequency, Propagation, Ions, Protons, Polarization, Plasma physics, Lightning, Scientific satellites.

An experimental study of the proton-whistler, a new VLF phenomenon observed in satellite data, is presented and an explanation of this new effect is given. It is proposed that the proton-whistler is simply a dispersed form of the original lightning impulse and that the dispersion can be explained by considering the effect of ions on the propagation of an electromagnetic wave in the ionosphere. The propagation of a wave in a multicomponent plasma for frequencies on the order of the ion gyrofrequencies is discussed. It is shown that the proton-whistler is an ion cyclotron wave which occurs via a polarization reversal process. Near the altitude and frequencies for which polarization reversal occurs it is shown that the right-hand polarized wave and the ion cyclotron wave may be strongly coupled. For frequencies on the order of the ion gyrofrequencies this coupling process plays an important part in determining what regions of the ionosphere are accessible to waves from a given source location.

AD-611 842 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
POSITIVE STABLE LAWS AND THE MASS DISTRIBUTION OF PLANETESIMALS,
by A. H. Marcus. Feb 65, 21p Rept. no. RM-4458-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Solar systems, Sources), (*Astronomy, Statistical analysis), Asteroids, Meteors, Planets, Physical properties.

The mass distribution of planetesimals undergoes evolution because small planetesimals accrete into larger ones and because large planetesimals break into smaller ones by collision. The mass distribution that results from accretion can be described asymptotically by one of the positive stable laws of probability theory since accretion is a strictly additive process. Certain properties of stable laws and random sums of independent, identically distributed random variables are reviewed. It is shown that, under certain assumptions about the initial distribution, the processes of accretion and collision will produce a distribution of mass that follows an inverse power law with the index 2/3. (Author)

AD-611 843 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missile and Space Co., Sunnyvale, Calif.
THE LATITUDE AND SEASONAL VARIATION OF DENSITY FROM 200 TO 800 KM,

by Albert D. Anderson. Feb 65, 50p
Rept. no. 6-75-65-6

Unclassified report

Descriptors: (*Atmosphere, Density), Atmospheric sounding, Satellites (Artificial), Orbital trajectories, Drag, Solar radiation, Measurement, Diurnal variations, Climatology, Geophysics.

The behavior of density with latitude and season has been derived above 200 km from satellite orbital decay (drag) data and the character of solar upper-atmosphere heating deduced from astronomy. The meridional density decreases from the equator to the poles, except for the summer in the respective hemisphere, where there is little or no gradient, and the fall in the northern hemisphere, which has a marked increase in density from the equator to 30 degrees - 40N. This latter trait is anomalous and unexplained. The density over the southern hemisphere in winter is less than that over the northern hemisphere in winter at the same altitude; the minimum density is found over the south pole. When the diurnal (longitude) effect is included, the isopycnics delineating the density bulge caused by the sun are asymmetric. At 200 km, the longitudinal density gradient is much less than at 800 km, so that the relative density contours are oriented more east-west than north-south, as at 800 km. A simple explanation is given for the semi-annual effect on the upper-atmosphere density found by Paetzold and Zschorner in satellite orbital decay data. (Author)

AD-611 852 Div. 2, 30

Marine Lab., Univ. of Miami, Coral Gables, Fla.
PROCEEDINGS OF THE 1964 ARMY CONFERENCE ON TROPICAL METEOROLOGY, HELD AT FORT MONMOUTH, NEW JERSEY, 14-15 MAY 1964.
Rept. no. 6,
by Homer W. Hiser and Harold P. Gerrish. Dec 64, 174p Rept. nos. ML-65035, 8226-6
Contract DA36 039SC89111

Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Meteorology, Tropical regions), (*Army research, Symposia), (*Symposia, Army research), Atmospheric motion, Meteorological parameters, Meteorological phenomena, Southeast Asia, West Indies, Pacific Ocean Islands, Central America, Japan, Africa, India, Climatology, Geophysics.

Contents: A summary of upper wind observations over Thailand and neighboring areas; Meteorological studies of Southeast Asia; Some preliminary results of the Barbados field program: A statistical measure of the importance of convection in tropical rainfall; Wind structure over a tropical island: A preliminary survey; Kinematics and dynamics of tropical precipitation; Hailstorms from tropics to mid-latitudes; Atmospheric electricity phenomena in the upper air over Poona, India; Friction over the sea; Comparison of mean seasonal pressure patterns over Africa with synoptic weather developments; Tropical rainfall patterns and associated meso-scale systems; A summary of meso-scale studies of instability patterns and winds in the tropics and subtropics at the University of Miami; Convection on the mesoscale; A circular cloud system south of Japan; Research at the national hurricane research project; Climatological aids to tropical analysis and forecasting; The feasibility of adding gravity waves to a common-model for numerical weather prediction in the tropics.

AD-611 853 Div. 2, 30
CFSTI Prices: HC$1.00 MF$0.50

Coast Guard, Washington, D. C.
OPERATIONAL NOTES ON A SHIPBOARD COMPUTER.
Oceanographic Manuscript,
by Richard M. Morse and Robert M. O'Hagan.
15 Oct 64, 12p

Unclassified report

Descriptors: (*Digital computers, Oceanographic equipment), (*Oceanographic equipment, Digital computers), (*Data processing systems, Digital computers), Oceanographic data, Reduction, Input-output devices, Shipborne, Coast Guard, Ships, Environmental tests, Maintainability, Oceanology.

A high speed solid state digital computer was tested and evaluated for use in reducing oceanographic data at sea. Testing took place aboard a Coast Guard vessel for a period of seven months in which the computer was subject to various stresses. The results of these tests and the usefulness of the computer programs indicate that advantages are gained in the speed, accuracy, and precision in which oceanographic data can be evaluated. (Author)

AD-611 939 Div. 2

Lamont Geological Observatory, Palisades, N. Y.
TRAVEL TIMES, BODY WAVES, AND NORMAL MODES OF THE EARTH,
by James N. Brune. 15 Aug 64, 30p
Contracts AF19 604 7376, DA31 124ARO D136
AROD 41201

Unclassified report

Pub. in Seismological Society of America. Bulletin (U. S.) v54 n6 p2099-2128 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismic waves, Propagation), Seismology, Velocity, Time, Geophysics, Mathematical analysis.

This paper describes the physical relationship between the normal mode and ray representations of body waves, and develops equations and experimental procedures for analyzing body waves in terms of normal modes. For the simplest body waves considered, the horizontally-polarized shear waves S sub H and (ScS) sub H, an equation relating the travel time curve to the phase velocity versus period curves corresponding to the various normal modes is derived. Theoretical seismograms of multiply reflected ScS waves and actual seismograms of S, ScS and PS waves are analyzed to test and illustrate the method. Results are given for phase velocities ranging from 8 to 37 km/sec and for mode numbers ranging from 3 to more than 10. The limited results are in agreement with the shear velocity distribution of the Gutenberg model for a Caracas-Halifax path (Atlantic Ocean region) and with that of the Jeffreys model for a Bermuda-Alert path (partly Atlantic Ocean and partly Canadian shield). A method for rapid computation of approximate theoretical dispersion curves, based on the above equations, is presented.

AD-611 948 Div. 2

Marine Physical Lab., Univ. of California, San Diego.
SEISMIC REFRACTION STUDIES IN GULF OF CALIFORNIA,
by Richard P. Phillips. 25 Jun 63, 34p
Rept. no. MPL-U-27/63
Contracts Nonr221605, Nonr221601

Unclassified report

Pub. in mono. Marine Geology of the Gulf of California: A Symposium, Memoir no. 3, 1964 p90-121(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismology, California), (*Marine geophysics, California), Seismic waves, Refraction, Marine geology, Oceanographic equipment, Test methods, Experimental data, Tables, Graphics.

During April and May of 1959, 26 seismic refraction stations were completed in the Gulf of California. In the shallow Northern Gulf province the crust of the earth consists of four layers-1.5 km of unconsolidated sediments with a velocity of 2.1 km/sec, 2.0 km of semi-consolidated sediments with a velocity of 4.1 km/sec, 4.3 km of basement material with a velocity of 5.4 km/sec, and a main crustal layer with a velocity of 6.7 km/sec. The total thickness of the crust is not well determined but appears to be about 25 km. In the central and southern sections of the Gulf only two layers can be resolved-a 1.3 km layer of unconsolidated material, and 6.2 km of material with a velocity of 5.8 km/sec. The subcrustal material has an average velocity of 7.8 km/sec and lies at a depth of 9.3 km. South of the Gulf proper the crust can be resolved into three layers-0.4 km of unconsolidated sediments, a 1.3 km layer with an average velocity of 5.5 km/sec, and a 4.3 km third layer with an average velocity of 6.7 km/sec. The upper mantle lies at an average depth of 8.9 km, and has a velocity of 7.7 km/sec. It is concluded that the northern portion of the Gulf of California has a structure similar to the continental borderland off Southern California, and that the southern section has a structure similar to the East Pacific Rise. (Author)

AD-611 960 Div. 2, 12

National Research Council of Canada, Ottawa (Ontario).
TELEVISION DISPLAY FOR NIMBUS-TIROS PICTURE TRANSMISSION SYSTEM. INFORMATION OBTAINED FROM WEATHER SATELLITES REQUIRES RAPID PROCESSING TO BE USEFUL IN METEOROLOGICAL FORECASTING,
by R. S. Richards and J. B. Bradley. 1964, 4p
Rept. no. NRC-8315

Unclassified report

Pub. in mono (paper) presented at the Canadian Symposium on Communications (no.3) n.p., n.d. (Copies available only to DDC users).

Descriptors: (*Meteorological satellites, Data transmission systems), (*Weather communications, Television display systems), (*Television display systems, Weather communications), Cloud cover, Pictures, Facsimile transmission, Magnetic recording systems, Television equipment, Wiring diagrams, Weather forecasting.

There were two principal objects in view: first, to provide the Meteorological Service with the earliest opportunity to study these directly transmitted pictures, and, second, to explore the possibilities of kinescope-camera display of data as opposed to facsimile display, with a view to possible production by Canadian industry for Canadian and foreign use. One of the advantages attendant on the use of magnetic tape and kinescope is that the reproducing electron beam can be programmed. As it turned out the camera tube is sensitive to changes in the magnetic field resulting from the spin of the satellite relative to the earth's magnetic field. This effect imposes a regular deflection on the reading beam, leading to a 'scalloping' of the received picture. It is possible, by the addition of an opposing deflection during the play back to provide some cancellation of this effect. It is claimed that the flexibility, reliability and simplicity of the tape-recorder /kinescope combination have been proved, and sufficient experience has been obtained to enable a greatly improved kinescope to be designed.

AD-611 994 Div. 2

California Univ., Los Angeles.
ELEMENTS AND EPHEMERIS OF 1948 OA AND EPHEMERIS OF (1566) ICARUS.,
by S. J. Herrick and K. C. Ford. 1964, 1p
Grant AFOSR241 63
AFOSR 65-0331

Unclassified report

Pub. in Journal of Minor Planets Circulars sic M.P.C. no. 2323, 1 Aug 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Celestial mechanics, Tables), (*Astronomical data, Celestial mechanics), (*Planets, Celestial mechanics), Catalogs, Astrophysics.

The astronomical data is presented in tabular form.

AD-612 026 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Lowell Technological Inst. Research Foundation, Mass.
RESEARCH DIRECTED TOWARD THE STUDY BY AIRBORNE AND GROUND OBSERVATIONS OF AURORA AND AIRGLOW EMISSIONS UTILIZING PHOTOMETERS AND SPECTROMETERS.
Final rept.,
by Henry A. Miranda, Jr., Robert J. Lecoz, and Robert E. Anctil. Dec 64, 24p
Contract AF19 628 4031, Proj. 7661, Task 766106
AFCRL 64-1010

Unclassified report

Descriptors: (*Aurorae, Spectroscopy), (*Sky brightness, Night sky), (*Night sky, Sky brightness), Aircraft, Photometers, Spectrum analyzers, Flight paths, Atlantic Ocean, Geophysics, Oxygen, Line spectrum, Interferometers.

A description of the work accomplished under this contract is presented. This effort involved studies related to night airglow latitude dependence, South Atlantic Anomaly, the Grainger-Ring effect and the oxygen line behavior studied with Fabry-Perot interferometers. The results are reported and discussed. Modification of the aurora and airglow laboratory on the AFCRL (KC-135-3131) Ionospheric Physics aircraft is also described. (Author)

AD-612 033 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Oregon State Univ., Covallis.
THEORETICAL AND FIELD STUDIES OF SEISMIC WAVES.
Final research rept. for 1 Apr 62-1 Apr 64,
by Joseph W. Berg, Jr. 1 Apr 64, 6p
Grant AF AFOSR62 376, Proj. 8652, ARPA Order 292 62

Unclassified report

Descriptors: (*Seismic waves, Underground explosions), Seismology, Theory, Position finding, Range finding, Nuclear explosions, Geophysics.

The objective of the research was to determine a method for evaluating the size of a seismic source using amplitudes and/or energy content of the seismic waves generated by the source. Each distance range (local, near-regional,

regional, and teleseismic) was considered separately to divide the major problem into several smaller ones. Only the initial seismic disturbance was considered for this work. Data recorded from Gnome, Hardhat, Haymaker, and Shoal nuclear explosions were chosen to represent the seismic sources for this work. The research that was done for seismic waves recorded in the various distance ranges will be discussed. In general, the continuity of energy of the seismic waves recorded from the above explosions was sought for the entire range of distances over which the seismic waves were recorded.

AD-612 068 Div. 2, 15
CFSTI Prices: HC$2.00 MF$0.50

Northwestern Univ., Evanston, Ill.
A REVIEW ON MEASURES OF CONTIGUITY FOR TWO AND k-COLOR MAPS,
by Michael F. Dacey. Feb 65, 41p
Technical rept. no. TR-2
Contract Nonr122833, Proj. NR389 140
Unclassified report

See also AD-608 634.

Descriptors: (*Maps, Measure theory), (*Topology, Maps), Algebra, Monte Carlo method, Geography, Sampling, Correlation techniques, Game theory, Statistical distributions, Probability, Distribution theory.

The use of measures of contiguity as one aspect of the geographic study of an area partitioned into regions is discussed, and two typical problems illustrate application of these methods. This report emphasizes contiguity measures for two and k color maps and is largely drawn from studies published in the late 1940's on the distribution of joins on two and k color lattices. A table useful for testing the hypothesis of randomness on two color maps is included; the double binomial distribution is tabulated with 5 DP for p = .01(.01).50, r = 1(1)10 and x = 0(1)r. (Author)

AD-612 083 Div. 2
CFSTI Prices: HC$5.00 MF$1.25

Air Force Cambridge Research Labs., Bedford, Mass.
GEOPHYSICS AND SPACE DATA BULLETIN NO. 3,
ed. by Anne L. Carrigan and Norman J. Oliver.
Jan 65, 199p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.
See also AD-609 997.

Descriptors: (*Geophysics, Periodicals), (*Space environmental conditions, Periodicals), Magnetometers, Cosmic rays, Neutrons, Intensity, Monitors, Radar reflections, High frequency, Electromagnetic waves, Propagation, Extraterrestrial radio waves, Data.

Contents: Component magnetometer; Cosmic ray neutron intensity monitor; Oblique backscatter radar; Oblique H-F propagation; Riometer; Solar radio emission-spectral observations.

AD-612 095 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
ADSORPTION OF SURFACE-ACTIVE MATERIAL AT THE SEA/AIR INTERFACE.
Interim rept.,
by N. L. Jarvis. 8 Feb 65, 15p Rept. no. NRL-6220
Task RUDC4B00 652 1F001 99 01
Unclassified report

See also AD-409 486.

Descriptors: (*Surface-active substances, Adsorption), (*Monomolecular films, Surface-active substances), (*Sea water, Surface properties), Surface tension, Organic materials, Oceanology, Pacific Ocean.

The concentration of soluble, surface-active, organic matter in the ocean will vary with time and location. In general, sufficient surface-active material will be present to provide closely packed films at the surface under favorable conditions. The rates of adsorption of the surface-active material at a sea/air interface were studied by measuring surface tension and surface potential as a function of time. The sea water samples studied were from the ocean near La Jolla, California. Surface potential measurements indicated that adsorption of surface-active material began immediately after the interface was cleaned; however, a noticeable decrease in surface tension was not observed until the water surface was covered with a continuous film of surface-active material. Between 10 and 60 minutes were usually required to give a film having a film pressure of a few tenths of a dyne/cm, the minimum film pressure normally associated with the damping of capillary waves. Changes in surface potential and surface tension were also determined as functions of the degree of compression of the adsorbed material. (Author)

AD-612 098 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Directorate of Scientific Information Services, Ottawa (Ontario).
THE RECENT ADVANCE OF THE MEDVEZHII GLACIER,
by L. D. Dolgushin, S. A. Evteev, A. N. Krenke, K. G. Rototaev, and N. M. Svatkov. Oct 64, 16p
Rept. no. T-409-R
TT 65-40731
Unclassified report

Trans. of Priroda (USSR) 1963, v. 52, no. 11, p. 85-92.
Also available from NRC as C-5080.

Descriptors: (*Glaciers, Motion), Ice, Mountains, Damage, Geology, USSR.

In May and June of 1963 there repeatedly appeared in many newspapers, both national and those of the Union Republics, contradictory reports of a sudden advance of the Medvezhii [Bear] glacier in the basin of the River Vanch, in the Pamir. The advance caused some damage and not a little trouble for the population in the valley of this river. A group of glacio-logists went to the Pamir to study the phenomenon on the spot. Some of the observations are presented in this paper. (Author)

AD-612 099 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Directorate of Scientific Information Services, Ottawa (Ontario).
A NEW TYPE OF TECTONIC STRUCTURE,
by A. Ya. Saltykovskii. Sep 64, 3p
Rept. no. T-415-R
TT 65-40748
Unclassified report

Trans. of Priroda (USSR) 1963, v. 52, no. 11, p. 113-114.
Also available from NRC as C-5102.

Descriptors: (*Structural geology, Far East), Petrology, Geological survey, Geophysics, USSR.

Independent structural units called epigons, or epigonals are discussed. These structures were developed after the stage of completed folding, and at some points upon areas of PreCambrian platform, or directly after the geosynclinal stage. Although formally epigons do possess a combination of features of geosynclinal and platform development, they are independent structures of the first order. One of the most characteristic of such structures is the West Transbaikal mobile zone. Within this zone, in the Lower Mesozoic, there took place an intensive magmatic activity, processes of fold formation, emplacement of a variety of intrusions. The deposits are, in the main, heterogeneous lava effusions and clastic formations of volcanic origin. Normal sedimentary deposits are rare. This zone was formed in a region that had successively passed through the Baikal stage of folding (about 1000 million years ago) the Caledonian stage (600 million years ago) and Hercynian stage (about 400 million years ago). The development of epigonal regions was characterized by a slow downwarping and the accumulation of the thick volcanogenic deposits, as would be appropriate for the initial stages of geosynclinal development.

AD-612 119 Div. 2, 12
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
DETERMINATION OF THE IONOSPHERIC ELECTRON CONTENT UTILIZING SATELLITE SIGNALS,
by Paul R. Arendt, Aristole Papayoanou, and Haim Soicher. 1964, 15p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Electron density, Determination), (*Ionosphere, Electron density), (*Satellites (Artificial), Electron density), Ionospheric sounding, Terrestrial magnetism, Mathematical analysis, Radio signals, Doppler effect, Phase shifts, Orbital trajectories.

Ionospheric electron content may be determined from satellite signals by both active and passive methods: the former involve measurements by the satellite itself, the latter involve measurements by ground stations. The paper touches on both methods, limiting the discussion to topside ionospheric sounding, for the active case, and to c-w transmission from the satellite and ground reception, for the passive case. Active methods, which yield complete information about the altitude profile of the electron density, depend on specific information regarding the satellite's position and the geomagnetic field strength along the radio path. Under restricted circumstances, passive methods are independent of such specific information.

AD-612 121 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Research and Development Activity, Fort Huachuca, Ariz.
NUMERICAL SOLUTION OF THE DISTRIBUTION OF WIND AND TURBULENCE IN THE PLANETARY BOUNDARY LAYER,
by J. F. Appleby and W. D. Ohmstede. 1962, 16p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y. 17-19 Jun 1964, Volume 1, AD-611 432.

Descriptors: (*Wind, Boundary layer), (*Turbulence, Air mass analysis), (*Air mass analysis, Boundary layer), Atmosphere models, Mathematical models, Micrometeorology.

Meteorology is subdivided according to the scales of micrometeorology, mesometeorology and macrometeorology. This division appears real since research interests and successes have been widely separated. If meso-scale phenomena are regarded as perturbations within the macroscale, two elements can be selected to characterize the divisions. These would be the logarithmic wind profile to characterize micrometeorology and the geostrophic wind to characterize the others. The purpose of this report is to present a hypothesis which unifies these two concepts. The model resulting from the hypothesis is solved and the results are presented in a form usable for many situations where it is necessary to predict the vertical distribution of the wind and turbulence characteristics within the planetary boundary layer. The treatment will be limited to the barotropic, adiabatic, steady state case.

AD-612 131 Div. 2, 8, 25
CFSTI Prices: HC$1.00 MF$0.50

Columbia Radiation Lab., New York.
RADIO ASTRONOMY AT MILLIMETER WAVELENGTH.
Final rept. for 16 Apr 59-30 Apr 62,
30 Apr 62, 16p
Contract AF49 638 631
AFOSR 3201
Unclassified report

Descriptors: (*Radio astronomy, Millimeter waves), (*Millimeter waves, Radio astronomy), (*Masers, Oscillators), (*Oscillators, Masers), Atmosphere, Oxygen, Nitrogen, Solar radiation, Temperature, Spectroscopy, Iron, Ions, Absorption, Atomic energy levels, Relaxation time, Parabolic antennas, Radiometers, Electron transitions.

MILLIMETER-BAND RADIOTELESCOPE: A complete M-band radiotelescope was built for application of techniques of millimeter-band radioastronomy to studies of (1) behavior of oxygen in the earth's high atmosphere and (2) the precise frequency of the coronal radiation due to the hfs transition of sextuply ionized atomic nitrogen. The radiotelescope had an equatorial mount capable of steering a 180-lb, 5-ft parabolic antenna with a millimeter-band Dicke radiometer. The temperature of the high atmosphere to which the peak of the oxygen line is sensitive varied enough on different days to produce changes of oxygen absorption. Calculations also showed that if the temperature of the atmosphere were 260 degrees K up to a height of 30 km and 240 K above 30 km, the nu(27)-line would not be detectable by the radiotelescope used at that time. MILLIMETER-WAVE MASER: A millimeter-wavelength maser oscillator was constructed by using iron (3+) in rutile. The structure of the lowest energy levels of iron (3+) in rutile was accurately determined, and the spin-lattice relaxation times and line width of some of the transitions were determined accurately.

AD-612 176 Div. 2, 4, 25
CFSTI Prices: HC$2.00 MF$0.50

Ohio State Univ. Research Foundation, Columbus.
TOTAL ABSORPTANCE OF NO NEAR 5.3 MICRONS USING N2 AS A PRESSURE BROADENING GAS,
by Dale Leroy Ford. Dec 64, 44p
Scientific rept. no. SR-1
Contract AF19 628 3806, Proj. 7670, Task 767003
AFCRL 64-1023
Unclassified report

Descriptors: (*Planetary atmospheres, Infrared radiation), (*Nitrogen compounds, Oxides), (*Infrared spectroscopy, Nitrogen compounds), (*Absorption spectrum, Nitrogen compounds), Infrared radiation, Attenuation, Spectrum analyzers, Band spectrum, Intensity, Nitrogen.

Spectra of the 5.3 micron band of NO were obtained using a double beam prism spectrometer. The total absorptance of the band was determined for NO concentrations of 0.004 to 5.4 atm cm and pressure broadened by N2 up to 2100 mm of Hg. Three cells were used with lengths of 1.55, 2.54 and 6.35 cm. The average broadening coefficient of NO relative to N2 was determined to be 1.00 ± 0.05. The band intensity was determined to be 115/atm/sq. cm S.T.P. ± 10%. (Author)

AD-612 180 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Oregon State Univ., Corvallis.
OREGON STATE UNIVERSITY SEISMOLOGICAL BULLETIN NO. 4, APRIL 1-JUNE 30, 1964,
by C. E. Schatz and Peter Dehlinger. Jan 65, 12p
Data rept. no. 18; Reference no. 65-1
Contracts AF19 628 2778, Nonr128610,
Proj. NR083 102

Unclassified report

See also AD-609 410.

Descriptors: (*Seismology, Periodicals), Seismological stations, Seismographs, Universities, Oregon, Earthquakes, Seismic waves, Tables, Geophysics.

Oregon State University operates a World-Wide Standard Seismograph Station at Corvallis and a seismic station at Klamath Falls, Oregon. The Corvallis station includes three short-period Benioff seismographs (T sub o = 1 sec, T sub g = 0.75 sec), three long-period Sprengnether seismographs (T sub o = 30 sec, T sub g = 100 sec), and a small short-period vertical Benioff seismograph (T sub o = 1.0 sec, T sub g = 0.2 sec) to provide visual recording on the OSU campus. The Klamath Falls station consists of a small short-period vertical Benioff seismograph (T sub o = 1.0 sec, T sub g = 0.2 sec), with visual recording on the campus of the Oregon Technical Institute. Tables are presented displaying the following data: sudden beginning of motion, gradual beginning of motion, following phase of arrival, magnitude, depth of focus, and epicentral distance from Corvallis.

AD-612 182 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Michigan Univ., Ann Arbor. Coll. of Literature, Science, and the Arts.
ABUNDANCES OF ELEMENTS IN STARS AND NEBULAE (DETERMINATION OF RATIO OF GAS PRESSURE TO ELECTRON PRESSURE IN STELLAR ATMOSPHERES).
Technical note,
by C. Cowley, A. Cowley, and L. Aller. Jul 62, 13p
Rept. no. TN-4;03719-4-T
Contract AF49 638 807, Proj. 03719
AFOSR 3433

Unclassified report

See also AD-612 193.

Descriptors: (*Stars, Chemical analysis), (*Nebula, Chemical analysis), Gases, Electrons, Pressure, Temperature, Ionization, Ionization potentials, Mathematical analysis, Computers.

The ratio of gas pressure (P sub g) to electron pressure (P sub e) has been computed over a range of temperatures by an approximate method and also by a more exact IBM 709 program. The approximate method shows large errors at low temperatures and high gas pressures. Tables give the values of log P sub g and log P sub e computed by the 709 as well as the relative abundances to which these values refer. (Author)

AD-612 183 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Michigan Univ., Ann Arbor. Coll. of Literature Science and the Arts.
ABUNDANCES OF ELEMENTS IN STARS AND NEBULAE (THE MANGANESE STAR 53 TAURI).
Technical note,
by L. H. Aller and W. P. Bidelman. Jul 62, 48p
Rept. nos. 03719-5-T, TN-5
Contract AF49 638 807, Proj. 03719
AFOSR 3434

Unclassified report

See also AD-612 193.

Descriptors: (*Stars, Chemical analysis), (*Nebulae, Chemical analysis), (*Astrophysics, Stars), Manganese, Gallium, Strontium, Yttrium, Zirconium, Magnesium, Calcium, Line spectrum, Electron transitions, Electron density, Ionization, Temperature, Experimental data, Graphics, Tables.

The chemical composition of the Manganese star 53 Tauri was studied with the aid of data secured with the coude spectrograph of the 120-inch reflector at the Lick Observatory. Transition probabilities required for the problem are obtained from laboratory sources whenever possible, but some are obtained by the calibration of stellar data. The temperature of the star, deduced from ionization equilibrium, is near 11,000K-a value in good agreement with that found from spectral energy scans by Jugaku and Sargent. The electron pressure in the atmosphere, deduced from the total intensities of hydrogen lines, appears to lie in the neighborhood of 500 dynes sq cm. Several striking abundance anomalies are found; they cannot be explained by deviations from local thermodynamic equilibrium. Manganese seems to be the most abundant metal in the star, but gallium appears to show the greatest enhancement of abudance over the 'normal' value. Strontium, yttrium, and zirconium are also enhanced in abudnace, whilst magnesium, and calcium seems to be depleted. (Author)

AD-612 193 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

Michigan Univ., Ann Arbor. Coll. of Literature, Science, and the Arts.
ABUNDANCES OF ELEMENTS IN STARS AND NEBULAE (SPECTRAL LINE STRENGTHS FROM ASTROPHYSICAL DATA).
Technical note,
by L. H. Aller. Jul 62, 35p Rept. nos. TN-3, 03719-3-T
Contract AF49 638 807, Proj. 03719
AFOSR 3432

Unclassified report

See also AD-282 368.

Descriptors: (*Stars, Spectroscopy), (*Nebulae, Spectroscopy), (*Astrophysics, Spectroscopy), Line spectrum, Electron transitions, Metals, Ions, Titanium, Chromium, Iron, Manganese, Quantum mechanics, Electron density, Temperature, Tables, Graphics.

An attempt is made to compile empirical log (gf lambda)'s for lines of metallic ions of FeII, FeIII, CrII, TiII, and

MnII. Here f is the Landenburg f, or oscillator strength, g is the statistical weight of the lower level, and lambda is the wavelength of the line. The curve of growth relates the equivalent width of a spectral line to the number of atoms capable of absorbing it and to the f-value of the transition involved. If the electron pressure and temperature in the stellar atmosphere are known, relative log gf lambda's can be determined. Furthermore, if laboratory absolute gf's are available for a few of these lines, then relative gf lambda's can all be converted to absolute gf lambda's. The advantages and limitations of these 'astrophysical' gf's are described, and it is emphasized that in order to secure adequate line strength data, one must (a) secure good line-intensity data (b) interpret these with the aid of a model atmosphere, taking into account effects of the stratification in the atmosphere. The gf lambda-values herein tabulated may be useful in analyzing the spectra of incandescent gases in laboratory or experimental sources of unknown temperature and pressure. (Author)

AD-612 203 Div. 2

Institute of Geophysics and Planetary Physics, Univ. of California, San Diego.
INSTRUMENTING THE SEA FLOOR,
by Hugh Bradner. 1964, 7p
Contract AF49 638 1388

Unclassified report

Pub. in IEEE Spectrum (U. S.) p108-14 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oceanographic equipment, Seismographs), (*Ocean bottom, Hydrographic surveying), (*Ocean bottom topography, Instrumentation), Telemeter systems, Oceanographic data, Electronic recording systems, Signal-to-noise ratio, Special purpose computers, Marine geophysics.

AD-612 212 Div. 2

Seismological Lab., Calif. Inst. of Tech., Pasadena.
SEISMIC WAVE ATTENUATION IN THE CRUST,
by Frank Press. 9 Jun 64, 2p
Contract AF49 638 1337

Unclassified report

Pub. in Journal of Geophysical Research (U. S.) v69 n20 p4417-8 15 Oct 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismic waves, Attenuation), Functional analysis, Lithosphere, Seismology.

AD-612 214 Div. 2

Seismological Lab., Calif. Inst. of Tech., Pasadena.
SPECTRAL RESPONSE OF AN ELASTIC SPHERE TO DIPOLAR POINT-SOURCES,
by Ari Ben-Menahem. 22 May 64, 18p
Contract AF49 638 1337

Unclassified report

Pub. in Seismological Society of America. Bulletin (U. S.) v54 n5 ptA p1323-40 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Spheres, Elasticity), (*Earth models, Seismology), (*Seismic waves, Propagation), Vibration, Force (Mechanics), Strain (Mechanics), Geophysics, Seismographs, Earthquakes, Spectroscopy, Sources, Vector analysis, Matrix algebra, Special functions, Azimuth.

A stratified elastic sphere is excited by an harmonic dipolar source of arbitrary orientation and depth. The total field is expanded in series of vector spherical harmonics and then condensed into a convenient form of a displacement dyadic. The Haskell-Gilbert matrix method is employed to obtain the radial factor of the displacements for a multilayered sphere. The dependence of the field on the azimuth angle and the fault elements is obtained for the case of a double-couple at depth. Expressions are also developed for the radiation pattern of surface waves over a spherical stratified earth. (Author)

AD-612 215 Div. 2

California Inst. of Tech., Pasadena.
SEISMIC SIGNAL ENHANCEMENT WITH THREE-COMPONENT DETECTORS,
by Michael Shimshoni and Stewart W. Smith. 25 Mar 64, 10p
.tract AF49 638 1337; Grant AF AFOSR62 421

Unclassified report

Pub. in Geophysics (U. S.) v29 n5 p664-71 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismic waves, Signal-to-noise ratio), Seismology, Seismographs, Polarization, Microseisms, Explosion effects, Earthquakes, Identification systems, Fourier analysis.

The time-averaged cross-product of vertical and radial components of ground motion is multiplied by the original signal producing a function of ground motion in which rectilinearly polarized motion is enhanced. This provides some separation of seismic signals from noise when both occupy the same frequency and velocity bands. The vertical and radial motion is decomposed into its Fourier components, and the parameters of an equivalent ellipse are computed at each instant of time. The eccentricity, major axis, and angle of inclination of the ellipse provide criteria for identifying P and SV waves of different velocities. (Author)

AD-612 216 Div. 2

Seismological Lab., Calif. Inst. of Tech., Pasadena.
INFERENCES ON CRUSTAL VELOCITIES AND DENSITIES FROM P WAVE DELAYS AND GRAVITY ANOMALIES,
by Frank Press and Shawn Biehler. 4 Apr 64, 17p
Contract AF49 638 1337

Unclassified report

Pub. in Journal of Geophysical Research (U. S.) v69 n14 p2979-95 Jul 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismology, Gravity), (*Gravity, Seismology), Seismic waves, Velocity, Structural geology, Geophysics, Correlation techniques, California.

A correlation is demonstrated between P wave delays and Bouguer gravity anomalies. For California data it is given approximately by delta g) = -355PD where (delta g) is the Bouguer (slab equivalent) gravity change in milligals and PD is the delay in seconds. The increases in P wave delays and negative gravity anomalies associated with topographic highs are manifestations of isostatic adjustment. However, composition changes of the type implied by empirical velocity-density relationships cannot explain the gravity changes associated with P wave delays in California batholiths. One way to reconcile the discrepancy is to postulate velocity reversals in the batholith. A thermal argument shows that anomalously

high temperatures are likely to occur under the Sierra Nevada because of the unusually large thickness of batholithic rock. Velocity reversals under such circumstances are plausible. (Author)

AD-612 217 Div. 2

California Inst. of Tech., Pasadena.
THEORETICAL AND OBSERVED ACOUSTIC-GRAVITY WAVES FROM EXPLOSIVE SOURCES IN THE ATMOSPHERE,
by David G. Harkrider. 14 Aug 64, 27p
Contract AF49 638 1337

Unclassified report

Pub. in Journal of Geophysical Research (U. S.) v69 n24 p5295-5321 Dec 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Explosion effects, Atmosphere), (*Atmosphere), (*Atmosphere, Explosion effects), Nuclear explosions, Acoustics, Mechanical waves, Gravity, Propagation, Geophysics, Atmosphere models, Mathematical models, Theory, Experimental data.

A matrix formulation is used to derive the pressure variation for acoustic-gravity waves from an explosive source in an atmosphere modeled by a large number of isothermal layers. Comparison of theoretical and observed barograms from large thermonuclear explosions leads to the following conclusions: (1) The major features on the barogram can be explained by the superposition of four modes, (2) different parts of the vertical temperature structure of the atmosphere control the relative excitation of these modes, (3) a scaled point source is sufficient to model thermonuclear explosions, (4) the observed shift in dominance of certain frequencies with yield and altitude can be explained by means of the empirical scaling laws derived from the direct wave near the explosion, and (5) out to 50 degrees from the source, the observed variation of amplitude with distance can be accounted for by geometrical spreading over a spherical surface. (Author)

AD-612 219 Div. 2

Osservatorio Geofisico Sperimentale, Trieste (Italy).
BULLETIN OF GEOPHYSICS, THEORY AND APPLICATION, V6 N24 P285-370 DEC 64, 1964, 90p
Contract DA91 591EUC2386

Unclassified report

Pub. in Bollettino di Geofisica Teorica ed Applicata (Italy) v6 n24 p285-370 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Geophysics, Periodicals), (*Basalt, Europe), Petrology, Well logging, Magnetic properties.

The Vogelsberg, north-east of Frankfurt, is one of the greatest basalt areas of Middle Europe. Measurements of the magnetization of samples from continuously cored drill holes of the Vogelsberg are reported. The inclination and the intensity of the natural remanent magnetization volume susceptibility and Q-factor were determined as a function of depth. All these quantities varied within each basalt sheet systematically. 17 basalts sheets (with normal as well as with inverse magnetization) showed a remarkable decrease of the natural remanent magnetization from top to bottom. In many cases also volume susceptibility and Q-factor decreased though not to the same extent. Similar results were obtained by measuring the magnetization of samples taken along vertical profiles crossing several sheets at a quarry face. Only for a few samples the stability of the remanent magnetization against a.c. - demagnetization was studied. The intensity of the remanent magnetization decreased by about 20% and then remained stable up to 430 Oersted.

AD-612 232 Div. 2

Cornell Univ., Ithaca, N. Y.
THE DIRECTION OF TIME AND THE EQUIVALENCE OF 'EXPANDING' AND 'CONTRACTING' WORLD-MODELS,
by D. L. Schumacher. 14 Nov 63, 5p
Grant AF AFOSR321 63
AFOSR 65-0407

Unclassified report

Pub. in Cambridge Philosophical Society. Proceedings (Gt. Brit.) v60 p575-9 1964. (Copies available only to DDC users).

Descriptors: (*Astronomy, Thermodynamics), Entropy, Time, Theory, Mass-energy relation, Statistical processes, Quantum mechanics, Models (Simulations), Geodesics.

It is assumed initially that only the increase on entropy defines locally the sense of advance of time. The assumption, together with the feature of global coherence of statistical processes, which is provided by the cosmic line-element, imply that there is a unique way of associating the standards with the cosmis statistical processes. There is hence a connexion between the sense of divergence of geodesics of fundamental observers and the cosmis time-sense. This is in keeping with the unmodified conservation laws of gravitation and the analogous adiabatic conservation law quite generally without dependence on the explicit form of the line element. These remarks correspond exactly to consequences of the 'elliptic' model in the case of deSitter space, obtained by entirely separate geometrical considerations. A remark is made with regard to the irreversibility associated with quantum measurement. (Author)

AD-612 242 Div. 2, 20

Palomar Observatory, Pasadena, Calif.
NUCLEOSYNTHESIS DURING THE EARLY HISTORY OF THE SOLAR SYSTEM,
by William A. Fowler, Jesse L. Greenstein, and Fred Hoyle. 17 Apr 61, 74p
Contract AF49 638 21
AFOSR 988

Unclassified report

Pub. in Geophysical Journal (Gt. Brit.) v6 n2 p148-220 1962 (Copies available only to DDC users).

Descriptors: (*Nuclear reactions, Solar systems), (*Solar systems, Nuclear reactions), (*Astrophysics, Nuclear reactions), Sources, Theory, Carbon, Deuterons, Lithium, Beryllium, Boron, Nitrogen, Extraterrestrial topography, Chemical analysis.

Abundances in terrestrial and meteoritic matter indicate that the synthesis of D(2), Li(6), Li(7), Be(9), B(10) and B(11) and possibly C(13) and N(15) occurred during an intermediate stage in the early history of the solar system. In this intermediate stage, the planetary material had become largely separated, but not completely, from the hydrogen which was the main constituent of primitive solar material. Appropriate physical conditions were satisfied by solid planetesimals of dimensions from 1 to 50 metres consisting of silicates and oxides of the metals embedded

in an icy matrix. The synthesis occurred through spallation and neutron reactions simultaneously induced in the outer layers of the planetesimals by the bombardment of high energy charged particles, mostly protons, accelerated in magnetic flares at the surface of the condensing Sun. The total particle energy was approximately 10 to the 45th power ergs while the average energy was close to 500 MeV per nucleon. Recent studies of the abundance of lithium in young T Tauri stars serve as the primary astronomical evidence for this point of view. The observed abundances of lithium and beryllium in the surface of the Sun are discussed in terms of the astronomical and nuclear considerations brought forward.

AD-612 263 Div. 2, 8, 30
CFSTI Prices: HC$2.00 MF$0.50

Washington State Univ., Pullman.
DESIGN OF A CELESTIAL ALTITUDE AND AZIMUTH COMPUTER.
Master's thesis,
by Edward Richard Fafara. 1965, 45p
Contract AF33 608 1130
Unclassified report

Descriptors: (*Celestial mechanics, Special purpose computers), (*Special purpose computers, Celestial mechanics), (*Analog computers, Radio astronomy), (*Radio astronomy, Analog computers), Servomechanisms, Positioning devices (Machinery), Radio equipment, Antennas, Solar systems, Position finding.

The Celestial Altitude and Azimuth Computer generates electrical signals, in terms of altitude and azimuth, which automatically directs a radio antenna to a selected celestial body, and causes the antenna to follow the body's motion in the solar system. The generation of these signals is accomplished entirely through electronic amplifiers and servo mechanisms, based upon input data from present functions. The preset functions, in the form of applied voltages, describes the antenna's geographic position, the sidereal position of the selected celestial body, and the relative position of the sidereal coordinate system to the geographic coordinate system.

AD-612 265 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

Boeing Scientific Research Labs., Seattle, Wash.
TROJAN ORBITS. I. D'ALEMBERT SERIES AT L sub 4,
by Andre Deprit and Andre Delie. Jan 65, 74p
Rept. no. D1-82-0393, Mathematical note no. MN-380
Unclassified report

Also available from the authors.

Descriptors: (*Celestial mechanics, Asteroids), (*Asteroids, Celestial mechanics), N-body problem, Planets, Series, Fourier analysis, Mapping (Transformations), Programming (Computers), Astrophysics.

The analytical continuation of the family of long period orbits at L sub 4 represents the normal Cartesian coordinates of the asteroid as d'Alembert series in function of an orbital parameter. By means of a program that enables a computer to calculate symbolically in the real graded algebra of d'Alembert series, the family of Trojan orbits is computed numerically up to the fourteenth order. Within the range of amplitudes of real Trojan planets, the d'Alembert series are in very close agreement with the numerical results of Prof. E. Rabe. Outside this range, the poor convergence of the Fourier series is found to be imputed, not to a 13:1 commensurability between the Trojan's libration period and Jupiter's orbital period, but to the slow convergence of the d'Alembert series all along the family of long period librations. (Author)

AD-612 333 Div. 2

Palomar Observatory, Pasadena, Calif.
THE EXISTANCE OF He3 IN 3 CENTAURI A.
Revised ed.,
by W. L. W. Sargent and Jun Jugaku. 19 May 61, 6p
Contract AF49 638 21
AFOSR 502
Unclassified report

Pub. in Astrophysical Journal (U. S.) v134 n3 p777-82 Nov 1961 (Copies not available to DDC or Clearinghouse customers).
Revision of rept. dated 5 Apr 61.

Descriptors: (*Stars, Spectroscopy), (*Helium, Stars), Astrophysics, Line spectrum, Isotopes, Hydrogen, Deuterium.

The positions of 10 He I lines have been measured on 5 high-dispersion plates of 3 Centauri A (B4p). Some of the lines are displaced longward of their normal wavelengths by up to 0.39 A. There is a good correlation between the observed shifts and the isotope shifts for He(3). On comparing the displacements in 3 Centauri with those measured in other B stars, we conclude that the Stark effect cannot produce shifts of the magnitude observed in 3 Centauri. Using the simple approximation that the observed displacements are proportional to the ratio He(3)/(He(3) + He(4), we find that this ratio in 3 Centauri is 0.84 ± 0.10. From a study of the profile of H gamma measured on 3 plates, we find that the ratio deuterium: hydrogen is less than about 0.01. We consider some possible ways in which He(3) could be produced in large quantities in the atmosphere of 3 Centauri.

AD-612 334 Div. 2

Palomar Observatory, Pasadena, Calif.
THE SPECTRUM OF ALPHA SCULPTORIS,
by Jun Jugaku and Wallace L. W. Sargent. 1961, 7p
Contract AF49 638 21
AFOSR 586
Unclassified report

Pub. in Astronomical Society of the Pacific. Publications (U. S.) v73 n433 p249-55 Aug 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stars, Spectroscopy), (*Astrophysics, Stars), Chemical analysis, Oxygen, Helium, Chromium, Titanium, Strontium, Line spectrum.

It is concluded that: (1) Alpha Sculptoris is a star of spectral type about B4 V; (2) it may be a spectrum variable; (3) oxygen and helium are underabundant by a factor of about five; and (4) chromium, titanium, and strontium are overabundant by an undetermined factor. The stars alpha Sculptoris and 3 Centauri appear to be the hottest objects whose spectra contain anomalous line intensities similar to those in the peculiar A stars. However, the peculiarities in the two stars are remarkably different. Thus, 3 Centauri has strong N II lines and normal C II lines, whereas the reverse is the case in alpha Sculptoris. In 3 Centauri phosphorus is overabundant by a factor of about 100 whereas in alpha Sculptoris phosphorus lines are not observed at all. In alpha Sculptoris some of the iron peak elements are enhanced; in 3 Centauri we do not observe lines of Ti II and Cr II. Weak lines of S II are observed in alpha Sculptoris. (Author)

AD-612 344 Div. 2

Palomar Observatory, Pasadena, Calif.
THE ATMOSPHERES OF TWO B-TYPE STARS IN THE GALACTIC HALO.
Revised ed.,
by G. Traving. 15 Jul 61, 21p
Contract AF49 638 21
AFOSR 50

Unclassified report

Pub. in Astrophysical Journal (U.S.) v135 p439-58 1962 (Copies not available to DDC or Clearinghouse customers).
Revision of rept. dated 19 Jan 61.

Descriptors: (*Stars, Spectroscopy), (*Astrophysics, Stars), Galaxies, Helium, Carbon, Nitrogen, Oxygen, Magnesium, Silicon, Ionization, Temperature, Line spectrum, Electron density, Mathematical models.

Spectra of two B-type stars--+33 degree 2642, which is at a galactic latitude of 49 degrees, and Barnard 29, a member of the globular cluster M13--have been analyzed by using the method of coarse analysis. In +33 degrees 2642 the relative abundance of He is approximately the same as in the main-sequence star tau, Sco, whereas the heavier elements C, N, O, Mg, and Si are less abundant by a factor of 5-10. In Barnard 29, for which only lower-dispersion spectra were available, only the He/H ratio could be determined. Compared with tau, Sco, it is smaller by a factor of 2. The colors of both stars are the same and correspond to spectral type B2. The procedure followed in this rough analysis is based on a generalization of the methods of Unsold. In addition, the theory of line broadening is discussed, for H and He I. The ionization temperature, derived from the measured strength of the Si III lines combined with the absence of the strongest lines of Si II and Si IV, was found to be 0.265 < theta < 0.295. The electron densities, from the broadening of H and He I lines, are log N = 13.32 (BD + 33 degrees 2642) and log N = 13.60 (Barnard 29). The surface gravities are smaller than for main-sequence B stars, log g = 2.34 and log g = 2.66. Using the known distance modulus of Barnard 29, we obtain its mass, 0.2 micro sun < or = micro B sub 29 < or = micro sun, which is extremely low. The uncertainty arises mainly from insufficient knowledge of turbulent velocities in the atmosphere. (Author)

AD-612 352 Div. 2

Stanford Univ., Calif.
STUDIES OF PLANETARY ATMOSPHERES. I. THE DISTRIBUTION OF ELECTRONS AND IONS IN THE EARTH'S EXOSPHERE,
by J. J. Angerami and J. O. Thomas. 13 Jul 64, 25p
Grant AF AFOSR62 370
AFOSR 65-0364

Unclassified report

Pub. in Journal of Geophysical Research (U. S.) v69 n21 p4537-60 Nov 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Exosphere, Charged particles), (*Electron density, Exosphere), (*Ions, Exosphere), (*Atmospheric sounding, Exosphere), Planetary atmospheres, Geophysics, Plasma physics, Atmospherics, Scientific satellites.

The factors which govern the distribution of electrons and ions in a planet's exosphere under diffusive equilibrium are discussed. The theory takes into account the effect of the electric field that arises from charge separation, the centrifugal force arising from the rotation of the planet, and the effect of the planet's gravitational field. It is assumed that the charged particles are constrained to move only along the direction of the planet's magnetic lines of force. The modifications that result in the electron and ion distributions when a temperature variation is assumed along a line of force are also considered. The results predicted by the theory are compared with actual experimental observations of the electron density distribution in the earth's exospheric plasma which have been obtained in recent years from whistler data and from topside ionograms made by the Alouette satellite. (Author)

AD-612 373 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
OBSERVATIONS OF A PARTIAL LUNAR ECLIPSE ON MARCH 24, 1959,
by M. A. Milkhikyer. Jan 65, 10p RSIC-368
TT 65-61815

Unclassified report

Trans. of Vsesoyuznoe Astronomo-Geodezicheskoe Obshchestvo. Byulleten' (USSR) 1960, no. 27 (34) p. 32-36.

Descriptors: (*Lunar eclipses, Physical properties), Photographs, Photography, Light, Colors, Brightness, Lunar environment, Moon, Photometers, Cameras, Images, USSR.

AD-612 375 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SUPPORTING NETWORK OF FOREIGN GRAVIMETRIE SURVEYS,
by A. I. Baiborodin. 13 Jan 65, 23p FTD-MT-64-252
TT 65-61817

Unclassified report

Edited machine trans. of Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros''emki i Kartografii. Trudy (USSR) 1960, v. 139, p. 61-75.

Descriptors: (*Geodesics, Standardization), (*Gravity, Measurement), USSR, North America, Europe, South America, Africa, Asia, Australis.

Two continental gravimetric bases are reported as almost completed, having been established as a result of a resolution of the International Geodesic and Geophysical Union. These are engaged in endeavors for standardization of the measurement of gravity. These are the North American base from Fairbanks, Alaska, to Mexico City, and the European base, including Norway, Denmark, England, Western Germany, France, and Italy. Other locations where there are increasing developments for measurement of gravity include Asia, Africa, Australia, and parts of South America.

AD-612 422 Div. 2, 6
CFSTI Prices: HC$1.00 MF$0.50

Centre National de la Recherche Scientifique, Paris (France).
HARP PROJECT.
Final scientific rept.,
by B. Authier, G. Carpentier, and R. Leblondet.
20 Aug 64, 4p
Contract AF61 052 809
AFCRL 65-67

Unclassified report

Descriptors: (*Night sky, Spectroscopy), (*Clouds, Spectroscopy), Exhaust gases, Aluminum compounds, Oxides, Fluorescence, Continuous spectrum, Ionosphere, Turbulence, France.

Results of studies are summarized that show that the night spectrum of T.M.A. extends from 3500 to 6500 A and, within a resolution of 50A, appears to be a continuum.

AD-612 433 Div. 2, 20

California Inst. of Tech., Pasadena.
EVOLUTION THROUGH ALPHA-BURNING (M = 3 TO 15 SOLAR M),
by Icko Iben, Jr. 1964, 1p
Contract Nonr22047, Grant NASA NGR05 002 028
Unclassified report

Pub. in Astronomical Journal (U. S.) v69 n8 p1323 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stars, Alpha particle reactions), (*Alpha particle reactions, Stars), Astrophysics, Beryllium, Carbon, Nitrogen, Gamma emission, Oxygen, Fluorine, Helium.

Models of 3, 5, 9, and 15 solar masses and Population I initial composition are followed from gravitationally contracting phases through hydrogen and helium burning stages up to the development of an (16)O core. The elements (12)C, (14)N, (16)O, (1)H, (3)He, and (4)He are followed in detail. Alpha-particle burning involves the reactions (8)B (Alpha, Gamma)(12)C, (12)C(Alpha, Gamma)(16)O, and (14)N(Alpha, Gamma)(18)F. It is found that, due to the extension of a convective envelope down to regions in which (12)C has been converted almost completely to (14)N, the surface ratio of (14)N to (12)C immediately proceding and following giant phases is considerably larger than this ratio in the contraction and early hydrogen-burning phases. From an initial value of 0.333, the (14)N/(12)C mass ratio increases to 1.27, 0.88, and 1.09 for M/Solar M = 9, 5, and 3, respectively. This ratio is not changed further during core-helium burning stages. Since, as the calculations show, a star in the mass range 3 < or = M/Solar M < or = 9 spends approximately 25% of its life in the core helium burning stage relative to its life near the main sequence in the core-hydrogen burning stage, a statistically large fraction of stars which lie in the Hertzsprung-Russell diagram where core-helium burning is expected to occur should show the predicted enhancement. (Report quoted in its entirety).

AD-612 437 Div. 2

Acoustics and Seismics Lab., Univ. of Michigan, Ann Arbor.
HIGH FREQUENCY MICROEARTHQUAKES RECORDED AT QUETTA, PAKISTAN,
by John DeNoyer. 14 Aug 64, 7p
Contracts AF19 604 8809, AF49 638 1170
Unclassified report

Pub. in Seismological Society of America. Bulletin (U. S.) v54 n6 ptB p2133-39 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Earthquakes, Pakistan), (*Seismology, Pakistan), High frequency, Seismic waves, Magnetic recording systems, Seismographs, Structural geology, Geophysics.

Numerous high frequency microearthquakes were recorded on a special portable magnetic tape recorder at Quetta, Pakistan, during the summer of 1962. These microearthquakes have maximum particle velocities between 30 and 50 cps. Many of the foci appear to be almost directly under the recording station. The focal distance for the nearest of these earthquakes appears to be less than one km. The source for these earthquakes may result from 'bedding plane slippage' as strain accumulates in sediments adjacent to a high angle fault. (Author)

AD-612 439 Div. 2

Columbia Univ., New York.
X-RAYS AND TYPE I SUPERNOVA REMNANTS,
by L. Woltjer. 5 Jun 64, 5p
Contract AF49 638 1358
AFOSR 65-0397
Unclassified report

Pub. in Astrophysical Journal (U. S.) v140 n3 p1309-13 Oct 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cosmic rays, X rays), (*X rays, Cosmic rays), (*Supernovae, X rays), Astrophysics, Nebulae, Interstellar matter, Gases, Galaxies, Absorption spectrum, Radio astronomy.

Bowyer, Byron, Chubb, and Friedman (Nature, 201:1307 (1964)) have observed X-rays from a source that probably is to be identified with the Crab Nebula. Chiu and Salpeter (Phys. Rev. Letters, 12:413 (1964)) have suggested that these X-rays are thermal radiation from a neutron star-which then would be the stellar remnant of the Crab Nebula supernova. Knowledge of Type I supernova remnants are briefly reviewed and an alternative possibility is discussed, which may be of interest since the existence of neutron stars is still somewhat in doubt. Three Type I supernovae have been definitely recorded in our galaxy during historical times: In 1054 (Crab Nebula), in 1572 (Tycho's supernova) and in 1604 (Kepler's supernova). Some data on these supernovae and their radio and optical remnants are assembled. Most data are self-explanatory. The interstellar absorptions were estimated from Hiltner's (Ap. J. Suppl. No. 24(1956)) data on nearby O and B stars.

3. Chemical Warfare Equipment and Materials

AD-611 745 Div. 3
CFSTI Prices: HC$3.00 MF$0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SELF-CONTAINED METHODS OF ANTI-RADIATION AND ANTI-CHEMICAL PROTECTION,
by V. A. Alkhazov and A. P. Tkachev. 15 Feb 65, 72p FTD-TT-64-998
TT 65-61785 Unclassified report

Unedited rough draft trans. of mono. Individual'nye Sredstva Protivoradiatsionnoi i Protivokhimicheskoi Zashchity, Moscow, 1963, 61p.

Descriptors: (*Protective masks, Chemical warfare), (*Bacterial aerosols, Protective masks), Protective mask filters, Respirators, Biological warfare agents, Chemical warfare agents, Radioprotective agents, Decontamination, Skin, Protective clothing, Storage, Adults, Children, USSR.

Contents:
Devices for protection of the organs of respiration:
- Filter-type gas masks
  - Gas masks for the adult population
  - Children's gas masks
  - Effect of the antigas on the human organism
- Isolating devices and apparatus
- Respirators
- Simplest protective devices
- Storage and maintenance of devices for the protection of the organs of respiration

Devices for protecting the skin:
- Skin protection devices on the basis of isolating materials
- Protective filtering suit
  - Impregnation for the protective filtering suit
- Rules of utilization of protective clothing
- Order of usage of the protective suit at different temperatures
- Rules for storage of skin protection equipment
- Improvised skin protection devices
  - Preparation of airtight accessories
  - Impregnation with improvised skin protection materials
  - Decontamination of improvised skin protection aids

4. Chemistry

AD-611 477 Div. 4, 20, 25

Michigan State Univ., East Lansing.
PROTON RESONANCE STUDY OF ANTIFERROMAGNETIC FeCl2.4H20,
by R. D. Spence, R. Au, and P. A. Van Dalen.
28 Jan 64, 5p
Grant AF AFOSR430 63
AFOSR 65-0182

Unclassified report

Pub. in Physica (Netherlands) v30 p1612-16 1964
(Copies available only to DDC users).

Descriptors: (*Protons, Resonance), (*Antiferromagnetism), Crystal structure, Paramagnetic resonance, Iron compounds, Chlorine compounds, Cryostats.

The proton resonance spectrum of FeCl2.4H2O has been examined in the temperature range 4.2K to 0.35K. We find: 4.2-1.1K-lines characteristic of the paramagnetic state; 1.1-0.7K-no lines; 0.7-0.35K-lines characteristic of the antiferromagnetic state. Using the observed local fields and symmetry arguments a structure for the antiferromagnetic spin arrangement is proposed. (Author)

AD-611 496 Div. 4, 25

Pittsburgh Univ., Pa.
A NUCLEAR QUADRUPOLE RESONANCE INVESTIGATION OF THE STRUCTURE OF HEXACHLOROBENZENE. Revised ed.,
by C. B. Richardson. 25 Mar 63, 1p
Grants AF AFOSR196 63, NSF G19797
AFOSR 65-0178

Unclassified report

Pub. in Acta Crystallographica (Denmark) v16 p1063 1963 (Copies available only to DDC users).
Revision of 26 Nov 62.

Descriptors: (*Halogenated hydrocarbons, Molecular structure), (*Aromatic compounds, Nuclear resonance), (*Nuclear resonance, Halogenated hydrocarbons), Chemical bonds, Single crystals, Crystal substructure, Symmetry (Crystallography), Atomic orbitals, Electric fields.

Nuclear quadrupole resonance measurements were made at -78C of the asymmetry in the electric field gradient tensors of hexachlorobenzene single crystals. The resultant value of 0.151 ± 0.016 at each Cl nucleus supports the double bond hypothesis of asymmetry. A temperature dependence of the NQR signal between -78C and OC is attributed to an increase in the amplitude of the libration of each molecule about its hexad axis with increasing temperature.

AD-611 511 Div. 4, 25

Copenhagen Univ. (Denmark).
THE STRUCTURE OF THIOPHENE,
by Borge Bak, Daniel Christensen, Lise Hansen-Nygaard, and John Rastrup-Andersen. 30 Nov 60, 7p
Contract AF61 052 73
AFOSR TN-60-1350

Unclassified report

Pub. in Journal of Molecular Spectroscopy (U. S.) v7 n1 p58-63 Jul 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Thiophenes, Molecular structure), (*Microwave spectroscopy, Thiophenes), S-heterocyclic compounds, Labelled substances, Line spectrum, Chemical bonds, Denmark.

The microwave spectra of 2-C13-thiophene and of 3-C13-thiophene were recorded and analyzed. In addition, three lines from the S34-thiophene were found and identified. Taken together with earlier published data for thiophene, thiophene-2d, and thiophene-3d, an unambiguous calculation of the ('r sub s'-) structure of thiophene is now possible, the structural parameters being: (distances) C-S = 1.714 A; C=C= 1.370A; C-C = 1.423 A; C(2)-H(2) = 1.078 A; C(3)-H(3) = 1.081 A; (angles) C(5)-S-C(2) = 92 deg. 10'; S-C(2)-C(3) = 111 deg. 28'; C(2)-C(3)-C(4) = 112 deg 27'; S-C(2)-H(2) = 19 deg. 51'; C(4) -C(3)-H(3) = 124 deg. 16'. (Author)

AD-611 514 Div. 4, 25

Leyden State Univ. (Netherlands).
SOME DEDUCTIONS FROM A FORMAL STATISTICAL MECHANICAL THEORY OF CHEMICAL KINETICS,
by John Ross and Peter Mazur. 27 Dec 60, 10p
Contract AF61 052 16
AFOSR 1846

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v35 n1 p19-28 Jul 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Statistical mechanics, Reaction kinetics), (*Reaction kinetics, Statistical mechanics), (*Thermochemistry, Statistical mechanics), Gases, Chemical reactions, Transport properties, Integral equations, Statistical distributions, Perturbation theory, Entropy, Netherlands.

A perturbation solution of an assumed Boltzmann-type equation for bimolecular chemical reactions in a homogeneous gas phase consisting of molecules with or without internal degrees of freedom, leads to the conclusion that the law of mass action as well as the usually assumed phenomenological rate expressions for chemical reactions, is strictly valid only in lowest order of the perturbation. Higher order perturbations introduce an affinity and time dependence in the rate coefficient and the law of mass action becomes inadequate to the extent of the contribution of the effects of the perturbations. A transition state formulation of rate coefficients for bimolecular gas-phase reactions is presented under less restrictive sufficient conditions than reported previously. (Author)

AD-611 527 Div. 4, 17, 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THERMODYNAMIC CALCULATIONS OF CERTAIN REACTIONS TAKING PLACE DURING THE SETTLING OUT OF TITANIUM CARBIDE FROM GASEOUS PHASE,
by V. P. Elyutin, G. I. Pepekin and B. S. Lysov.
12 Feb 65, 11p FTD-TT-64-933
TT 65-61772

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Chernaya Metallurgiya (USSR) 1963, v. 6, no. 11, p. 5-10.

Descriptors: (*Titanium compounds, Carbides), (*Carbides, Thermochemistry), (*Refractory coatings, Vapor plating), (*Thermochemistry, Carbides), Chlorides, Reduction (Chemistry), Hydrogen, Methane, Vapors, Chemical equilibrium, Heat of reaction, USSR.

An examination is made of the thermodynamic characteristics of the possible reactions taking place during the reduction of titanium tetrachloride vapors with hydrogen. Evidence indicates the TiCl4 is successivly reduced through TiCl3 and TiCl2 to free metallic Ti which immediately reacts with carbon from methane in the mixture to form TiC.

AD-611 537 Div. 4, 7, 14
CFSTI Prices: HC$2.00 MF$0.50

Aerospace Research Center, General Precision, Inc., Little Falls, N. J.
HIGH TEMPERATURE RESISTANT PHTHALOCYANINE POLYMERS.
Quarterly progress rept. no. 1, 1 Nov 64 31 Jan 65, by J. Luloff and C. Vogel. 15 Feb 65, 37p
Contract NObs92081
Unclassified report

See also AD-608 263.

Descriptors: (*Phthalocyanines, Heat-resistant plastics), (*Heat-resistant plastics, Phthalocyanines), (*Metalorganic compounds, Synthesis (Chemistry)), Silicone plastics, Titanium compounds, Aluminum compounds, Polymerization, Elastomers, Electric insulation, Silicon compounds, Resorcinol, Chlorides, Polymers.

The program is concerned with the preparation and evaluation of metallophthalocyanine polymers to be used as high temperature stable insulating elastomers, resins and coatings for electrical and electronic devices. The program deals mainly with the synthesis of high-molecular-weight copolymers in which the metallophthalocyanine unit is bonded to the primary polymer chain through residual valencies on the central metal atom rather than through the peripheral carbon atoms. In this way, the intrinsic high chemical and thermal stability of this polynuclear aromatic system may be retained and contribute to the over-all stability of the polymer. Based on the behavior of model compounds, copolymers employing metallophthalocyanine units in the polymer backbone are expected to remain stable up to about 500C. A 1:1 resorcinol silicon phthalocyanine copolymer was isolated by the pyrolytic elimination of resorcinol from diresorcinoxysilicon phthalocyanine. The polymer was a dark blue, powdery material which was apparently unaffected by heating in air to temperatures attainable with an ordinary Bunsen burner. Progress was made with the development of an improved high-yield process for the synthesis of good-quality dichlorosilicon phthalocyanine.

AD-611 572 Div. 4, 14, 25
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
A MASS SPECTROMETRIC METHOD FOR THE DETERMINATION OF PERMEABILITY COEFFICIENTS.
Interim rept.,
by F. E. Saalfeld and M. V. McDowell. 30 Dec 64, 12p
Rept. no. NRL-6182
Proj. RR001 01 43 4804
Unclassified report

Descriptors: (*Permeability, Mass spectroscopy), (*Mass spectroscopy, Permeability), (*Synthetic rubber, Permeability), Membranes, Diffusion, Pressure, Nitrogen, Oxygen, Carbon dioxide, Gases, Porosity, Spectrum analyzers.

A method for the determination of permeability coefficients from mass spectral data has been described in detail. The method has been illustrated by the determination of permeability coefficients for the systems N2-neoprene, O2-neoprene, and CO2-neoprene at room temperature. The value for the permeability coefficient Q for CO2 through neoprene has been shown to be independent of membrane thickness with diaphragms of 0.081 and 0.200 cm thickness (Q=13.1±0.3x10 to the minus eleventh power and 13.3±0.2x10 to the minus eleventh power sq cm/sec torr, respectively). The data presented shows that Q increases with a decrease in the pressure of 1.0 to 0.5 atmosphere across the membrane. For the CO2-neoprene system, the values of Q for pressure differentials of 1.0, 0.75, and 0.50 atmosphere are 13.3±0.02x10 to the minus eleventh power, 16.2±0.2x10 to the minus eleventh power, and 19.2±0.1x10 to the minus eleventh power sq cm/sec torr, respectively. For the same three pressure differentials with N2-neoprene, the values of Q were found to be 2.87±0.04x10, to the minus eleventh power, and 7.00±0.03x10 to the minus eleventh power sq cm/sec torr, respectively. This trend was not checked for the O2-neoprene system due to experimental difficulties. The values for Q at a pressure differential of 1 atmosphere agree with previously published values. (Author)

AD-611 596 Div. 4, 16

Prairie Regional Lab., Saskatoon (Saskachewan).
THE OXYGENATED FATTY ACIDS FROM THE OIL OF THE SPORES OF LYCOPODIUM SPECIES,
by A. P. Tulloch. 1 Oct 64, 6p Rept. no. NRC-8236
Unclassified report

Pub. in Canadian Journal of Chemistry v43 p415-20 1965
(Copies available only to DDC users).

Descriptors: (*Plants (Botany), Fatty acids), (*Spores, Fatty acids), (*Vegetable oils, Fatty acids), (*Fatty acids, Spores), Alcohols, Fatty acid esters, Chromatographic analysis, Stearates, Canada.

The oil from the spores of commercial Lycopodium, mainly L. complanatum, contains cis-9,10-epoxyoctadecanoic acid (2%), (+)-8-hydroxyhexadecanoic acid (7%), and (±)-threo-9,10-dihydroxyoctadecanoic acid (4%). Smaller amounts of 8-oxohexadecanoic acid and an epoxyhexadecanoic acid also seem to be present. (Author)

AD-611 600 Div. 4

California Univ., Berkeley.
ACIDITY OF HYDROCARBONS. VI. METALATION OF NORBORNADIENE WITH BUTYLLITHIUM,
by A. Streitwieser, Jr. and R. A. Caldwell.
9 Apr 62, 2p
Grant AF AFOSR62 175
AFOSR 65-0221
Unclassified report

Pub. in Journal of Organic Chemistry (U. S.) v27 p3360-1 Sep 1962 (Copies not available to DDC or Clearinghouse customers).
See also AD-611 353.

Descriptors: (*Hydrocarbons, pH), (*Aromatic compounds, Metallation), (*Metallation, Chemical bonds), Lithium compounds, Metalorganic compounds, Molecular structure, Atomic orbitals, Spectra (Infrared), Nuclear magnetic resonance, Deuterated compounds, Atomic energy levels.

Experiments were performed in order to obtain evidence relating to the relative acidities of the various hydrogens in norbornadiene. Of particular interest is the relative mobility of the 7-hydrogens (bridge). Norbornadiene was allowed to react with excess butyllithium in refluxing ether-heptane. After quenching

with deuterium oxide, the recovered norbornadiene was studied by infrared and n.m.r. The results demonstrate no significant exchange of bridge hydrogens but do show almost complete metalation of a vinyl position. The availability of norbornadiene makes this procedure acceptable as a preparation of norbornadiene-2-d. In this type of metallation exchange reaction, the vinyl hydrogens of norbornene are clearly much less acidic than those of norbornadiene. One possible explanation is that each double bond in norbornadiene exerts an important inductive effect to enhance the acidity of the other. (Extracted).

AD-611 601 Div. 4

California Univ., Berkeley.
TRITIODE PROTONATION OF BIPHENYLENE,
by A. Streitwieser, Jr. and I. Schwager.
5 Aug 63, 1p
Grant AF AFOSR62 175
AFOSR 65-0229

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v85 p2855 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aromatic compounds, Dehydrogenation), (*Dehydrogenation, Reaction kinetics), Tritiated compounds, Chemical equilibrium, Decomposition.

The rates of tritiodeprotonation of biphenylene were determined for both the 1- and 2-positions. The rate constants obtained were k-alpha=0.0000432/sec and k-beta=0.00275/sec; k-beta/k-alpha=64.

AD-611 602 Div. 4

California Univ., Berkeley.
ACIDITY OF HYDROCARBONS. X. EXCHANGE RATES OF RING-SUBSTITUTED TOLUENE-alpha-t's WITH LITHIUM CYCLOHEXYLAMIDE IN CYCLOHEXYLAMINE,
by A. Streitwieser, Jr. and H. F. Koch. 26 Aug 63, 6p
Grant AF AFOSR62 175
AFOSR 65-0224

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v86 p404-09 5 Feb 1964 (Copies not available to DDC or Clearinghouse customers).
See also AD-611 603.

Descriptors: (*Hydrocarbons, pH), (*Aromatic compounds, Exchange reactions), (*Cyclohexanes, Exchange reactions), (*Exchange reactions, Reaction kinetics), Lithium compounds, Amides, Metalorganic compounds, TNT, Deuterated compounds, Tritiated compounds, Halogenated hydrocarbons, Polycyclic compounds, Molecular isomerism, Chemical bonds.

Relative exchange rates at 50C toward lithium cyclohexylamide in cyclohexylamine of substituted alpha-tritio-toluenes and some alpha deuteriotoluenes are: H, 1.00; o-CH3, 0.60; m-CH3, 0.60; p-CH3, 0.31; 0-CH(CH3)2, 0.41; m-CH(CH3)2, 0.61; p-CH(CH2), 0.29; o-F, 12; m-F, 22; p-F, 0.73; m-CF3, 60; p-CF3, approx. 180; m-OCH3, 2.1; p-OCH3, 0.091. These values fit a Hammett sigma-rho correlation with rho = 4.0, a value higher than that for phenol or anilinium dissociations. The extension to polycyclic systems is discussed. (Author)

AD-611 603 Div. 4

California Univ., Berkeley.
ACIDITY OF HYDROCARBONS. IX. RATES OF EXCHANGE OF ARYL HYDROGENS WITH LITHIUM CYCLOHEXYLAMIDE IN CYCLOHEXYLAMINE,
by A. Streitwieser, Jr. and R. G. Lawler.
17 Jul 63, 2p
Grant AF AFOSR62 175
AFOSR 65-0228

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v85 p2854-5 20 Sep 1963 (Copies not available to DDC or Clearinghouse customers).
See also AD-611 455.

Descriptors: (*Hydrocarbons, pH), (*Aromatic compounds, Exchange reactions), (*Cyclohexanes, Exchange reactions), (*Exchange reactions, Reaction kinetics), Lithium compounds, Amides, Metalorganic compounds, Chemical bonds, Molecular structure, Electrostatics.

By analogy with previous work with toluene, it was expected that aryl hydrogen exchange would proceed via the aryllithium intermediate. Confirming evidence was found in the relatively large decelerating effect of a methyl substituent and accelerating effect of a phenyl substituent on the rate of exchange of the hydrogens of benzene. The greater exchange rate of the 3-biphenylyl position over the 4-position indicates that carbene-carbanion resonance I is not important in these cases. The perturbation of the P1-electron system due to a change in Coulomb integral by the presence of a negative charge on carbon would also appear to be of minor importance. The experimental results are interpretable quantitatively in terms of a simple electrostatic model. (Extracted)

AD-611 604 Div. 4

California Univ., Berkeley.
A MOLECULAR ORBITAL STUDY OF THE POLAROGRAPHIC REDUCTION IN DIMETHYLFORMAMIDE OF UNSUBSTITUTED AND METHYLSUBSTITUTED AROMATIC HYDROCARBONS,
by A. Streitwieser, Jr. and I. Schwager. 20 Jun 62, 5p
Grant AF AFOSR62 175
AFOSR 65-0226

Unclassified report

Pub. in Journal of Physical Chemistry (U.S.) v66 p2316-20 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aromatic compounds, Reduction (Chemistry)), (*Polarographic analysis, Aromatic compounds), Atomic orbitals, Electrochemistry, Organic solvents, Formamides, Chemical bonds, Polycyclic compounds, Molecular structure.

The half-wave potentials of a number of aromatic compounds were determined and are found to fit the same type of correlation with the energies of the lowest vacant molecular orbitals in the HMO approximation established in other solvents. The deviation of biphenylene from this correlation can be accounted for in terms of 'long bonds' but this explanation fails when applied to 2,3-benzobiphenylene. Azulene and acepleiadylene do not obey the simple theory. The effect of methyl substituents is accounted for successfully in terms of a combination of conjugative (hyperconjugation) and inductive influences. (Author)

AD-611 605 Div. 4

California Univ., Berkeley.
ACIDITY OF HYDROCARBONS. XV. RELATIVE

STABILITIES OF TRIPHENYLMETHYL AND BRIDGE-HEAD TRIPTYCYL CARBANIONS,
by A. Streitwieser, Jr., R. A. Caldwell, and M. R. Granger. 26 Jun 64, 1p
Grant AF AFOSR62 175
AFOSR 65-0225

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v86 p3578 1964 (Copies not available to DDC or Clearinghouse customers).
See also AD-611 602.

Descriptors: (*Hydrocarbons, pH), (*Cyclohexanes, Exchange reactions), (*Polycyclic compounds, Stability), Lithium compounds, Cesium compounds, Amides, Metalorganic compounds, Reaction kinetics, Chemical bonds, Ions, Stereochemistry.

As part a continuing study of base-catalyzed proton-exchange reactions between hydrocarbons and cyclohexylamine it was found that cesium cyclohexylamide is some 1000-10000 times more reactive than lithium cyclohexylamide. Despite this large difference in reactivity, relative rates of exchange of different hydrocarbons are closely similar with both catalysts. The bridgehead position of triptycene is clearly comparable in acidity to aromatic hydrogens and its acidity is much greater than that of saturated hydrocarbons. This enhanced acidity of triptycene can only be attributed to the inductive effect of the attached benzene rings since resonance conjugation with these rings is unlikely. More than half of the enhanced acidity of triphenylmethane over saturated hydrocarbons is due to the inductive effect of the three benzene rings and that less than half can be attributed to resonance stabilization of the carbanion. To the extent that relief of steric strain contributes to the acidity of triphenylmethane, the role of resonance is still less. (Extracted)

AD-611 606 Div. 4

California Univ., Berkeley.
SPECTRA OF SOME ALKALI SALTS OF HYDROCARBONS,
by A. Streitwieser, Jr. and J. I. Brauman. 6 May 63, 4p
Grant AF AFOSR62 175
AFOSR 65-0227

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v85 p2633-6 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrocarbons, Salts), (*Polycyclic compounds, Absorption spectrum), (*Lithium compounds, Absorption spectrum), (*Cesium compounds, Absorption spectrum), Cyclohexanes, Amides, Aromatic compounds, Spectra (Visible and ultraviolet), Metalorganic compounds, Salts, Band spectrum, Electron transitions, Atomic orbitals, Ions, Solvent action, Alkali metal compounds.

Electronic absorption spectra are presented for lithium salts of fluorene, the benzofluorenes, 4,5-methylene-phenanthrene, benzanthrene, fluoradene, 9-methyl- and 9-phenylfluorene, xanthene, triphenylmethane, and tris-(p-biphenylyl)-methane in cyclohexylamine. Some cesium salts are included as well as some spectra in 1,2-dimethoxyethane and ether. The spectra are discussed in terms of simple molecular orbital theory and the cation effect and solvent effect are interpreted. (Author)

AD-611 619 Div. 4

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Chemistry.
CHARACTERISTICS OF POROUS CELLULOSE ACETATE MEMBRANES FOR THE SEPARATION OF SOME INORGANIC SALTS IN AQUEOUS SOLUTION,
by S. Sourirajan. 4 May 64, 9p Rept. no. NRC-8191

Unclassified report

Pub. in Journal of Applied Chemistry (Gt. Brit.) v14 p506-13 Nov 14 1964 (Copies available only to DDC users).

Descriptors: (*Cellulose acetates, Membranes), (*Membranes, Surface properties), (*Salts, Separation), Porous materials, Capillaries, Sorption, Solutions, Ions, Water, Fluid flow, Fluid dynamic properties, Sodium compounds, Chlorides, Mixtures, Nitrates, Canada.

Experimental results are presented to illustrate the effect of operating variables on the separation and flow characteristics of porous cellulose acetate membranes. The results are discussed from the point of view of the preferential sorption and capillary flow mechanism, together with the concept of related and unrelated solution systems. It was found that under identical experimental conditions of constant molality of feed solution, feed flow rate, operating pressure and temperature, the separation and flow characteristics of the membranes are uniquely related for all solution systems containing (monovalent or bivalent) cations and anions of the same respective valency. These relations can be expressed by a system of experimentally determined characteristic curves which can then be used to predict the performance of any similar membrane. The general form of these curves representing the relative separation data for aqueous solutions containing ions of the same valency has given rise to the concept of related feed solution systems.

AD-611 620 Div. 4

Washington Univ., Seattle.
THE HYDRATION OF STYRENES,
by W. M. Schubert, Bo Lamm, and James R. Keeffe.
22 Jun 64, 4p
Grant AF AFOSR590 64
AFOSR 65-0231

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v86 p4727-9 1964 (Copies not available to DDC or Clearinghouse customers).
Research supported in part by the National Science Foundation, Washington, D. C.

Descriptors: (*Aromatic compounds, Chemical reactions), Hydrogen, Addition reactions, Reaction kinetics, Chemical equilibrium, pH, Organic solvents.

Evidence is presented which is consistent with the rate-determining step in the hydration of styrenes being a proton transfer to styrene to form a carbonium ion: H3O(+) + ArCH = CH2 yields H2O + ArC(+)HCH3 yields products.

AD-611 646 Div. 4

Army Medical Research and Nutrition Lab., Denver, Colo.
THE SEPARATION OF HEXOSEPHOSPHATES AND TRIOSEPHOSPHATES BY THIN-LAYER CHROMATOGRAPHY,
by Paul P. Waring and Zigmund Z. Ziporin.
21 Oct 63, 5p

Unclassified report

Pub. in Journal of Chromatography (Netherlands)

v15 p168-72 1964 (Copies available only to DDC users).

Descriptors: (*Hexoses, Separation), (*Saccharide phosphates, Separation), Chromatographic analysis, Phosphates, Organic phosphorus compounds, Solvents, Cellulose, Powders, Adsorption, Binders.

The separation of hexosephosphates and triosephosphates may be obtained by use of TLC, using a cellulose adsorbent without binder. While the hexosephosphates resolved into well-defined spots, 3-phosphoglyceric acid and 2-phosphoglyceric acid did not separate. (Author)

AD-611 726 Div. 4

Fordham Univ., New York.
PYROLYSIS AND PHOTOLYSIS OF 1-METHYL-3-DIAZOOXINDOLE. BASE DECOMPOSITION OF ISATIN 2- TOSYLHYDRAZONE,
by Emil J. Moriconi and John J. Murray. 4 Jun 64, 9p
Grant AF AFOSR62 18
AFOSR 65-0374

Unclassified report

Pub. in Journal of Organic Chemistry (U. S.) v29 p3577-84 Dec 1964 (Copies not available to DDC or Clearinghouse customers). Presented in part at the Organic Div. of the National Meeting of the American Chemical Society, (148th) Chicago, Ill., Sep. 1964.

Descriptors: (*Indoles, Decomposition), (*Hydrazones, Decomposition), (*Pyrolysis, N-heterocyclic compounds), (*Photochemistry, N-Heterocyclic compounds), Azines, Pyridines, Molecular isomerism, Spiro compounds, Nuclear spin resonance, Free radicals, Bromides, Phosphines, Organic pigments.

Pyrolysis of 1-methyl-3-diazooxindole (I) in refluxing ethanol led to 1, 1'-dimethylisoindigo (II) and 1, 1'-dimethylisatinazine (III), and in the presence of pyridine N-oxide produced II, (III), and 1-methylisatin (IV). Photolysis of (I) in ethanol gave 3-ethoxy-1-methyloxindole (V); photolysis in cyclohexene led to two geometric cyclopropane isomers (VI and VII) resulting from cis addition to the cycloolefin, and in hexane solution containing 1, 1-diphenylethylene produced the spirooxindole (VIII). Compounds (II), (IV), (III), and (V)-(VIII) were probably formed by appropriate reaction with the pyrolytically and photolytically generated oxindolylene acting as a singlet. This same oxindolylene also displayed triplet character in the e.s.r. spectrum at 4K., in reaction with oxygen to form (IV), and with photolytically generated Cl. atoms and C13C. free radicals (from CC14) to yield 3-chloro-3-trichloromethyl-1-methyloxindole. At room temperature, (I) reacted with bromine and triphenylphosphine to form 3,3-dibromo-1-methyloxindole and the phosphazine adduct (IX), respectively. Pyrolysis of (IX) led to the triphenylphosphine, (II) and (III), but no ylide. (Author)

AD-611 728 Div. 4, 25

Rensselaer Polytechnic Inst., Troy, N. Y.
MELTING AND PRE-MELTING PHENOMENA IN ALKALI METAL NITRATES,
by G. J. Janz, F. J. Kelly and Jeanne L. Perano.
8 Aug 63, 4p
Grant AF AFOSR 181 63
AFOSR 65-0383

Unclassified report

Pub. in Journal of Chemical and Engineering Data (U. S.) v9 n1 p133-6 Jan 1964 (Copies are not available to DDC or Clearinghouse customers).

Descriptors: (*Alkali metal compounds, Nitrates), (*Heat of fusion, Alkali metal compounds), (*Nitrates, Alkali metal compounds), Melting, Transition temperature, Phase studies, Entropy, Enthalpy, Theromodynamics, Thermochemistry.

Data for the heat content, heats and entropies for the solid-state transition (276C), and for fusion (307C), gained by the method of phase-transition drop calorimetry, are reported. The thermal data confirm that the solid-state transition in NaNO3 has unusual features. The change persists from 180 to 280C., and appears about 60% complete at 270C. This, and the relatively small magnitude of the thermal effects rate of change of entropy, 0.32 /deg. mole), are examined relative to the nature and extent of the solid-state transition. A comparison of the fusion and pre-fusion parameters for a related series of nitrate and chloride salts is presented and discussed relative to a 'premonition of melting' effect as evidenced by such continuous solid-state transition regions. The lower melting point and smaller change in volume on fusion also appear interrelated. (Author)

AD-611 731 Div. 4

California Univ., Berkeley.
ON KUHN'S OMEGA DOUBLE PRIME-MOLECULAR ORBITAL METHOD,
by A. Streitwieser, Jr., A. Heller, and M. Feldman. 9 Nov 63, 3p
Grant AF AFOSR62 175
AFOSR 65-0377

Unclassified report

Pub. in Journal of Physical Chemistry (U. S.) v68 p1224-6 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atomic orbitals, Theory), (*Molecular structure, Theory), Electron density, Dipole moments, Ionization potentials.

Further study was made of the method of Kuhn (Tetrahedron, 19, suppl. 2, 88, 389, 437 (1963)) which gives consideration to potential associated with neighboring atoms. The omega single prime technique, with effect limited to the nearest neighbors of the carbon atom, was applied to the benzyl cation, azulene, fulvene, and heptafulvene. The omega single prime was regarded as showing promise.

AD-611 733 Div. 4

McMaster Univ., Hamilton (Ontario).
SELENIUM ISOTOPE EFFECTS IN FLUORINE NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY,
by T. Birchall, S. L. Crossley, and R. J. Gillespie.
10 Jun 64, 2p

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n9 p2760-61 1 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear magnetic resonance, Selenium compounds), (*Selenium compounds, Fluorides), (*Nuclear spectroscopy, Selenium compounds), Selenium, Isotopes, Nuclear spins.

A selenium isotope effect on the fluorine chemical shift was observed in several selenium-fluorine compounds for all of the naturally occurring selenium isotopes except 74Se. Values for some 77Se-19F coupling constants were reported. (Author)

AD-611 739 Div. 4, 25

Johns Hopkins Univ., Baltimore, Md.
CROSS SECTIONS FOR SOME GAS-PHASE SINGLE-CHARGE-TRANSFER REACTIONS OF N2(++) AND Ar(++),
by E. R. Weiner, G. R. Hertel, and W. S. Koski.
26 Aug 63, 2p
Contract AF49 638 1301
AFOSR 65-0372

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v39 n12 p3538-39 15 Dec 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nitrogen, Exchange reactions), (*Argon, Exchange reactions), (*Exchange reactions, Probability), Ions, Water vapor, Gases, Mass spectrum.

Results are summarized of measurements of the charge-transfer cross sections for a single-electron transfer to a doubly charged ion for the reactions N2(++) + N2 = N2(+) + N2(+), N2(++) + H2O = N2(+) + H2O(+), Ar(++) + Ar = Ar(+) + Ar(+).

AD-611 768 Div. 4
CFSTI Prices: HC$3.00 MF$0.75

Research Triangle Inst., Durham, N. C.
THE INVESTIGATION FOR ALTERNATE METHODS FOR THE SYNTHESIS OF 3-QUINUCLIDINOL AND OTHER AZABICYCLIC ALCOHOLS.
Final rept. for 31 May 63-30 May 64,
by F. I. Carroll and S. G. Levine. 30 May 64, 60p
Contract DA18 108 63AMC154

Unclassified report

Descriptors: (*N-heterocyclic compounds, Alcohols), (*Alcohols, Synthesis (Chemistry)), Piperidines, Bromides, Ethylene oxide, Pyridines, Aldehydes, Molecular structure, Spectra (Infrared).

Attempts to prepare 3-quinuclidinol via 4-bromoacetyl-piperidine hydrobromide, 4-pyridylethylene oxide, pyridine-4-carboxaldehyde cyanohydrin, and 1-benzyl-piperidine-4-carboxaldehyde are described in detail.

AD-611 806 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Kansas Univ., Lawrence. Dept. of Chemistry.
LOW TEMPERATURE VOLTAMMETRY AND ELECTRON PARAMAGNETIC RESONANCE STUDIES.
Final rept.,
by Ralph N. Adams. 1965, 6p
Grant AF AFOSR62 14
AFOSR 65 0340

Unclassified report

Descriptors: (*Electrochemistry, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Electrochemistry), Ions, Free radicals, Electrodes, Electrons, Paramagnetic resonance, Absorption spectra, Low-temperature research.

A brief summary is given of EPR investigations involving radical ion intermediates in various electrode reactions. A bibliography of publications generated under the contract is included.

AD-611 847 Div. 4, 25
CFSTI Prices: HC$1.00 MF$0.50

Reactions Motors Div., Thiokol Chemical Corp.,
Denville, N. J.
KINETICS OF CONDENSATION FROM THE VAPOR PHASE.
Quarterly rept. for Nov 64-Jan 65,
by Welby G. Courtney. Feb 65, 5p Rept. no. RMD-5515
Contract Nonr415400

Unclassified report

See also AD-608 542.

Descriptors: (*Vapors, Condensation), (*Condensation, Reaction kinetics), (*Nucleation, Condensation), Water vapor, Argon, Phase studies, Thermodynamics.

The theoretical problems involved in nucleation are being re-examined further. Theoretical computation of cluster energy using a simple molecular-pair model is being explored. The problem is to predict the thermodynamic equilibrium concentration of such clusters. This equilibrium concentration of a certain-sized cluster is related to the free energy of the cluster. The free energy of the cluster in turn involves its translation and rotation energies and also the vibration energy of the cluster. The manuscript titled 'Re-Examination of Nucleation and Condensation of Water' is being revised and a computer is being used to evaluate the energies of various-sized argon clusters. A detailed summary of the computation of cluster energy will be given in the next report.

AD-611 848 Div. 4
CFSTI Prices: HC$2.00 MF$0.50

New York Univ., N. Y.
THE ANODIC REACTION MECHANISM IN FUSED SILVER NITRATE.
Technical progress rept.,
by Nirmal Gupta and Benson R. Sundheim.
16 Feb 65, 27p
Contract Nonr28537

Unclassified report

To be presented at the Symposium on Fused Salts at the meeting of the Electrochemical Society San Francisco, May 9-14, 1965.

Descriptors: (*Silver compounds, Nitrates), (*Nitrates, Oxidation), (*Anodes (Electrolytic cell), Electrochemistry), Platinum, Nitrogen compounds, Oxides, Oxygen, Transport properties, Dissociation.

The oxidation of the nitrate ion at a Pt anode in molten AgNO3 was studied by steady state and fast sweep voltammetry. Two mechanisms are found, both leading to NO2 + 1/2O2. The first is susceptible to transport control and has an N-alpha value of 1.17 at 238C. It is postulated that this mechanism involves the preliminary dissociation of the nitrate ion to form NO2(+) + O2(=), the latter (possibly bound as orthonitrate) being the electroactive species. The second mechanism is not subject to transport control and has an N-alpha value of 0.90. This is thought to involve the formation of NO3 radical followed by its decomposition to form the products. If the E sub o values of 0.357V and 1.25V (vs. Ag/Ag(+)) are adopted, the two mechanisms are characterized by exchange current densities of 0.0024 amp/sq. cm and 0.19 amp/sq. cm, respectively. The corresponding values calculated for k sub o, the heterogeneous rate constant, are 1.3 x 10 to the -7th power and 1.1 x 10 to the-7th power cm/sec. (Author)

AD-611 863 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

DEPARTMENT OF GENERAL AND TECHNICAL CHEMISTRY LECTURE,
by A. N. Nesmeyanova. 26 Feb 65, 17p
FTD-TT-64-881
TT 65-61800

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Vestnik, 1964, v. 34, no. 4, p. 98-105.

Descriptors: (*Chemistry, USSR), (*Chemical industry, USSR), Fertilizers, Petroleum, Petroleum industry, Catalysis, Polymerization, Polymers.

The Department of General and Technical Chemistry is claimed to exclude the fields of biochemistry, chemistry of natural compounds, agricultural chemistry, and chemistry of inorganic materials. The central committee of the Communist Party is reported in Dec. 1963 to have divided chemical industry into (1) greater chemistry, measured in a capacity of millions of tons, and (2) small chemistry, measured in a production of hundreds of kilograms and tons to thousands of tons, only seldom reaching tens of thousands of tons. For the so-called greater chemistry, there are listed synthetic fertilizers and chemicals from petroleum hydrocarbons, natural gas, and coke. Techniques of value to this type of industry are catalysis and polymerization. For the so-called small chemistry, there are tens of thousands of industrial derivatives rather than the tens of substances of greater chemistry.

AD-611 885 Div. 4, 16

Naval Medical Research Inst., Bethesda, Md.
TRIS (HYDROXYMETHYL) AMINOMETHANE AS A STANDARD FOR KJELDAHL NITROGEN ANALYSIS.
Rept. no. 4,
by F. Lee Rodkey. 19 Aug 63, 7p
Proj. MR005 02 0011 01

Unclassified report

Pub. in Clinical Chemistry v10 n7 p606-10 Jul 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nitrogen, Chemical analysis), (*Chemical indicators, Amines), (*Volumetric analysis, Standards), Alcohols, Acids, Solutions, Carbon dioxide.

Solutions of tris (hydroxymethyl) aminomethane (Tris) were shown to be a convenient primary standard for the Kjeldahl analysis. This compound is readily available in analytical reagent grade and has all the desirable properties of a primary standard. It is unnecessary to protect the Tris solution from CO2, as any reaction between Tris and this gas cannot be detected by the titrimetric procedures involved. (Author)

AD-611 892 Div. 4

Walter Reed Army Inst. of Research, Washington, D. C.
UNSYMMETRICAL DISULFIDES FROM AN AMINO BUNTE SALT,
by Daniel L. Klayman, Jerry D. White and Thomas R. Sweeney. 31 Jul 64, 2p

Unclassified report

Pub. in Journal of Organic Chemistry (U. S.) v29 p3737-8 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sulfides, Synthesis (Chemistry)), (*Thiosulfates, Thiols), Amino acids.

The reaction of Bunte salts (alkyl thiosulfates) with mercaptans has been used with varying success in the synthesis of unsymmetrical disulfides. 2-Aminoethanethiosulfuric acid was used to prepare an unsymmetrical disulfide containing the cysteamine (mercaptoethylamine) moiety. The reaction of sodium 2-aminoethanethiosulfate with a sodium mercaptide in water by the method of Footner and Smiles proceeded with a slow uptake of the thiol. The use of methanol as the solvent for the above reaction markedly increased the rate of the reaction. A prompt precipitation of sodium sulfite occurred and the mercaptan was consumed in less than 5 min. The insolubility of sodium sulfite in methanol presumably served to drive the reaction to completion. Performance of the reaction at 0, rather than at room or elevated temperatures, improved yields. Reactions run at -10 or below were too slow to be useful. The mixed disulfides were isolated and purified as hydrochloride salts.

AD-611 900 Div. 4, 25

British Columbia Univ. (Vancouver).
HALOGEN-ATOM REACTIONS. II. LUMINESCENCE FROM THE RECOMBINATION OF CHLORINE ATOMS,
by L. W. Bader and E. A. Ogryzlo. 29 Jun 64, 5p
Grant AF AFOSR158 63
AFOSR 65-0380

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n9 p2926-30 Nov 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Halogens, Recombination reactons), (*Chlorine, Recombination reactions), (*Luminescence, Chlorine), Reaction kinetics, Microwaves, Electric discharges, Spectroscopy, Canada.

A spectroscopic study of an orange-red glow from the products of electrical discharge in chlorine has resulted in an identification of the emitter as C12(A3Π(ou)(+)). A kinetic study has provided evidence for the formation of excited molecules in this state by the preassociation of 2P3/2 chlorine atoms. Several detailed mechanisms for the reaction are discussed. (Author)

AD-611 903 Div. 4

Rensselaer Polytechnic Inst., Troy, N. Y.
CRYOSCOPY AND IONIC MIXING INTERACTIONS IN MOLTEN NITRATES,
by G. J. Janz and T. R. Kozlowski. 21 Jun 63, 2p
Grant AF AFOSR181 63
AFOSR 65-0381

Unclassified report

Pub. in Journal of Physical Chemistry (U. S.) v67 p2857-8 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nitrates, Thermochemistry), Liquids, Salts, Solvents, Phase studies, Sodium compounds, Heat of fusion, Enthalpy, Ionization, Solutions, Transition temperatures.

AD-611 906 Div. 4, 10

Lockheed Missiles and Space Co., Palo Alto, Calif.
THERMAL DECOMPOSITION OF HEXANITROETHANE,
by Henry P. Marshall, Frank G. Borgardt, and Paul Noble, Jr. 21 Feb 64, 5p

Unclassified report

Pub. in Journal of Physical Chemistry (U. S.)

v69 p25-9 (Copies not available to DDC or Clearinghouse customers).

Presented before the Division of Physical Chemistry at the National Meeting of the American Chemical Society (145th) New York, N. Y., Sep 1963.

Descriptors: (*Solid rocket oxidizers, Pyrolysis), (*Organic nitrogen compounds, Pyrolysis), (*Pyrolysis, Reaction kinetics), Solids, Solvents, Carbon tetrachloride, Cyclohexanes, Combustion products, Nitrogen compounds, Oxides, Carbon dioxide.

The rates of decomposition of hexanitroethane were determined in a number of solvents and as the pure solid in the temperature range of 60 to 100C. The products of reaction from the thermal decomposition of the solid are best represented by the equation: (NO2)3C-C(NO2)3 yields 3NO2 + NO + N2O + 2CO2. Decomposition of hexanitroethane (HNE) for the pure solid and in CCl4 proceeds by a first-order reaction; the specific first-order rate constants are, for solid HNE, k = 10 to the 18.6 power exp(-38,9000/RT)/sec., and for HNE in CCl4, k = 10 to the 18.5 power exp(-37,800/RT)/sec. The rate of decomposition of hexanitroethane in n-haptane is 11.5 times faster, and in cyclohexane it is 23 times faster, than that of the pure solid at 85C. Based on the kinetic data and products of reaction, a mechanism for the decomposition process is proposed. (Author)

AD-611 915 Div. 4

Johns Hopkins Univ., Baltimore, Md.
THE ARGON-DEUTERIUM HYDRIDE ION REACTION,
by M. A. Berta and W. S. Koski. 8 Jul 64, 4p
Contract AF49 638 1301
AFOSR 65-0236

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v86 p5098-101 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Deuterated compounds, Hydrides), (*Argon, Deuterated compounds), Reaction kinetics, Mass spectroscopy, Ions.

Reactions of HD(+) with argon (eq. 1-3) have been studied using a tandem mass spectrometer. In the first two reactions , attention was centered on the isotope effect, and the ration ArH(+)/ArD(+) between 2 and 25 e.v. varied from 1.3 to 1.9, respectively. In the charge-transfer reaction, the cross section was measured from 2 to 70 e.v., and indications were obtained that the reacting HD(+) ions were in vibrationally excited states. (Author)

AD-611 923 Div. 4

Arkansas Univ., Fayetteville.
ELECTRODE POTENTIALS IN FUSED SYSTEMS. VIII. OXIDATION KINETICS OF SILVER IN SODIUM CHLORIDE,
by Kurt H. Stern and Walter E. Reid, Jr.
17 Apr 64, 9p
Contract AF49 638 653
AFOSR 65-0369

Unclassified report

Pub. in Journal of Physical Chemistry (U. S.) v68 n12 p3757-64 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrochemistry, Electrodes), (*Electrodes, Silver), (*Silver, Oxidation), (*Oxidation, Reaction kinetics), Sodium compounds, Chlorides, Melting, Ions, Oxygen, Pressure.

The oxidation rate of metallic silver in molten sodium chloride was studied as a function of oxygen partial pressure and temperature (800-900). The rate of appearance of silver ions was followed by an e.m.f. method. These ions are formed by: (A) the reaction of O2 with silver and (B) the reaction Ag + Na+ = Ag+ + Na. The rate of (A) is a linear function of po2 in the range 0 < p(o2) < 1 atm. For p(o2) = 1 at 870, r(A) = 11.9 X 10, to 15th power r(B) = 0.35 X 10 to 15th power atoms/sq cm sec. With increasing time dAg+1/dt decreases because of the reverse of reaction A-the formation of metallic silver from Ag(+) and O(-2) ions-for which r(A)(01) = (r(A) + r(B)/K(A)p(o2) to 1/2 power, where K(A) the equilibrium constant for (A), is 8.3 X 10-7th power on the mole fraction scale. The general differential equation for this system is derived and numerically integrated. It is concluded that the rate-determining step for (A) is the chemisorption of O(2), which is hindered by an adsorbed layer of chloride ions, and that for (B) charge transfer is rate-determining. (Author)

AD-611 925 Div. 4

California Univ., Davis.
THE PHOTOCHEMISTRY OF URANYL OXALATE,
by D. H. Volman and J. R. Seed. 15 Jul 64, 4p
AROD 3861-1

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v86 p5095-8 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Photochemistry, Oxalates), (*Oxalates, Uranium compounds), (*Uranium compounds, Oxalates), Reaction kinetics, Quantum mechanics.

The photolysis of aqueous solutions of uranyl oxalate-oxalic acid was studied at various intensities, wave lengths, temperatures, concentrations, and acidities. The results are interpreted by the stoichiometrical relations: (1) H2C2O4 CO + CO2 + H2O; (2) H2C2O4 CO2 + HCOOH; and (3) U6 + H2C2O4 2CO2 + 2H+ + U4. The fraction of decomposition attributable to each pathway was found to be independent of intensity, wave length, and temperature and to depend on concentration and acidity. Quantum yields of gaseous product formation were evaluated for various experimental conditions. Mechanisms for (1) and (2) are given using the simplest uranyl complexes, UO2(HC2O4)+ and UO2(C2O4). For (3) a mechanism is given which accounts for the products by single electron-transfer steps and disproportionation of Uv to UIv and Uvl. (Author)

AD-611 929 Div. 4, 25

Connecticut Univ., Storrs.
MEASUREMENTS OF THERMAL DISSOCIATION OF HYDROGEN, USING FAST PROTONS,
by Grant J. Lockwood, Herbert F. Helbig, and Edgar Everhart. 15 Jun 64, 5p
AROD 2805-10

Unclassified report

Pub. in Journal of Chemical Physics (U.S.) v41 n12 p3820-24 Dec 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrogen, Dissociation), (*Proton bombardment, Hydrogen), Proton scattering, High temperature research, Tungsten, Proton beams, Ions, Fast protons, Atomic properties, Molecular properties.

Experiments involving study of the angular scattering of kiloelectron-volt protons from atomic and molecular

hydrogen targets were used to measure directly the fraction of hydrogen gas dissociated in equilibrium with hot tungsten. The state of the hydrogen gas in a tungsten furnace is determined by analyzing the scattered incident particles which result from single collisions between the incoming protons and the hydrogen gas in the furnace. In particular, the number of H(-) ions among the scattered particles is a measure of the molecular hydrogen density, since H(-) ions cannot be created in single collisions between protons and hydrogen atoms. Under the present experimental conditions it was possible to achieve a fraction dissociated of over 87.5% at a furnace temperature of 2380K and still higher fractions at higher temperatures. These measurements are made at hydrogen pressures of the order of (.01) Torr. The practical conditions under which an atmosphere of highly dissociated hydrogen can be created are described and it is pointed out how the dissociation fraction and also the density of the hydrogen can be directly measured in the otherwise inaccessible interior of the gas. These measurements using a proton beam probe do not require that the pressure or temperature of the hydrogen be known and, in fact, do not require thermal equilibrium conditions. (Author)

AD-611 930 Div. 4, 25

Cornell Univ., Ithaca, N. Y.
CRITICAL OPALESCENCE OF BINARY MIXTURES: PERFLUOROTRIBUTYLAMINE ISOPENTANE,
by P. Debye, D. Caulfield, and J. Bashaw. 29 Jun 64, 4p
Grant AF AFOSR62 12
AFOSR 65-0373

Unclassified report

Pub. in Journal of Chemical Physics (U.S.) v41 n10 p3051-54 Nov 1964 (Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Light, Scattering), (*X rays, Scattering), (*Amines, Optical properties), (*Aliphatic compounds, Optical properties), Mixtures, Molecular association, Reflection, Intensity, Fluorides.

Critical opalescence of the binary liquid mixture perfluorotributylamine and isopentane is investigated. By combining light scattering and x-ray scattering measurements, data over a broad range of values of s/lambda (s = 2 sin (theta/2), lambda is wavelength) are obtained. The second moment of the averaged intermolecular pair potential is determined. It is shown how deviations from straight line behavior in plots of reciprocal intensity versus (s/lambda)square are determined by the shape of the intermolecular pair potential curve. (Author)

AD-611 938 Div. 4, 25

Loyola Univ., Chicago, Ill.
RADIATIONLESS TRANSITIONS AND DEUTERIUM EFFECT ON LUMINESCENCE OF SOME AROMATICS,
by E. C. Lim and Joseph D. Laposa. 2 Sep 64, 3p
AROD 2459 7

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n10 p3257-59 15 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aromatic compounds, Electron transitions), (*Electron transitions, Aromatic compounds), (*Luminescence, Electron transitions), (*Deuterium, Electron transitions), Labelled substances, Polycyclic compounds, Atomic energy levels, Absorption spectrum.

The work was undertaken to see if the deuterium effect on triplet-state lifetimes indeed arises entirely from the mass dependence of radiationless transition and to examine the possible existence of a significant Ssub 1 to Ssub 0 (lowest excited singlet to ground singlet) radiationless transition and a deuterium effect on Ssub 1 to Tsub 2 radiationless transition. The results suggest the relative importance of the Ssub 1 to S 0 radiationless transition and the absence of a significant deuterium effect on the Ssub 1 to Tsub 2 radiationless transition among aromatic hydrocarbons and their derivatives. These results are in accord with the Robinson-Frosch theory of electronic energy relaxation. (Extracted)

AD-611 963 Div. 4

Illinois Univ., Urbana.
ORGANOMETALLIC COMPOUNDS. II. SYNTHESIS AND ATTEMPTED RESOLUTION OF COMPOUNDS OF THE TYPE R2SnCh2.
Revised ed.,
by W. H. Nelson and D. F. Martin. 5 Jun 64, 6p
Contract DA31 124ARO D52
AROD 3717 2

Unclassified report

Pub. in Journal of Inorganic and Nuclear Chemistry (Gt. Brit.) v27 p89-93 1965 (Copies available only to DDC users).
Revision of 28 Apr 64.

Descriptors: (*Metalorganic compounds, Synthesis (Chemistry)), (*Tin compounds, Metalorganic compounds), Thallium compounds, Condensation reactions, Molecular isomerism, Absorption spectrum, Dipole moments, Molecular structure.

The synthesis and properties of compounds of the type R2SnCh2 (where R = C6H5 and Ch = acetylacetonate, benzoylacetonate, dibenzoylmethanate and 8-quinolinolate) are described. Compounds of this type are conveniently prepared by the condensation of the thallium(I) chelate and dichlorodiphenyltin. The isomer pattern is considered for compounds of the type R2SnCh2 and evidence is presented that these compounds exist predominantly in the trans form in nonpolar solvents. (Author)

AD-612 010 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Wisconsin Univ., Madison.
REACTIONS BETWEEN SECONDARY AMINES AND ORGANO-HALOGENATING AGENTS.
Semi-annual rept. no. 2, 1 Jan-30 Jun 64,
by Takeru Higuchi. 15 Jul 64, 23p
Contract DA18 108AMC209A

Unclassified report

See also AD-434 296.

Descriptors: (*Amines, Halogenation), (*N-heterocyclic compounds, Chemical reactions), (*Halogenation, Amines), Exchange reactions, Reaction kinetics, Hypochlorites, Degradation, Chemical equilibrium, Hydrolysis, Carbon dioxide, Volumetric analysis.

Kinetics of chlorine acceptance by succinimide suggests that the negative ionic form of the imide is responsible for the main course of the reaction. Additional data were obtained on the rate of reversible halogen transfer from N-chlorosuccinimide (NCSI) to various secondary amines. Preliminary results on the reactions of quinuclidine with halogenating agents indicate the great stability of the resulting chloroammonium form. The rate of formation of this species from hypochlorous acid and the base was determined. Although the mechanism of breakdown of NCSI in solution has not as yet been solved, several additional bits of information were obtained. (Author)

AD-612 040 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Kent State Univ., Ohio.
A NEW APPROACH TO MEASUREMENT OF DIPOLE MOMENT AND ELECTROLYTES IN PURE ACETIC ACID.
Final rept. for Apr 59-Dec 64,
by R. Thomas Myers. Dec 64, 9p
Contract AF49 638 641
AFOSR 65-0366
Unclassified report

See also AD-413 467.

Descriptors: (*Dipole moments, Measurement), (*Electrolytes, Acetals), Acids, Solutions, Solvents, Dielectric properties, Synthesis (Chemistry).

In the method introduced here interpolations, rather than extrapolations, are used, and the value obtained in solution for dipole moment is apparently the same as that in the gas phase, within the experimental error of measurements of the latter. The chief reason for inability to make a definite statement here is the discordant data for dipole moments. (Author)

AD-612 070 Div. 4, 25
CFSTI Prices: HC$2.00 MF$0.50

General Dynamics/Fort Worth, Tex. Nuclear Aerospace Research Facility.
EXCITATION OF ETHYLENE, ACETYLENE, PROPYNE, AND 1-BUTYNE BY LOW-ENERGY ELECTRON IMPACT.
Technical rept. for 1 Oct 63-30 Sep 64,
by C. R. Bowman and W. D. Miller. Jan 65, 36p
Rept. no. FZK-213
Contract AF29 601 6213, Proj. 6773, Task 677302
WL TR-64-148
Unclassified report

Descriptors: (*Alkenes, Excitation), (*Aliphatic compounds, Excitation), (*Electron transitions, Aliphatic compounds), (*Molecular spectroscopy, Aliphatic compounds), Electron bombardment, Inelastic scattering, Selection rules, Absorption spectrum, Spectra (Visible and ultraviolet), Atomic orbitals, Gas ionization, Radiation chemistry.

The excitation spectra of ethylene, acetylene, propyne, 1-butyne, 2-butyne, and 3-hexyne were measured by means of a trapped-electron technique which permits the detection of approximately 93 percent of inelastically scattered electrons independent of scattering angle. Excitation potentials and relative intensities are tabulated for both optically allowed and optically forbidden transitions. Correlation with available ultraviolet absorption data and molecular-orbital theory is used to establish transition assignment. A 1.7-ev excitation in ethylene is attributed to temporary negative-ion formation. In acetylene at 2.0 ev, excitation is postulated as resulting from excitation of the triplet sigma (+) u state. Low-energy maxima occur in propyne, 1-butyne, 2-butyne; however, the complexity of these molecules precludes a meaningful assignment of transitions at this time. (Author)

AD-612 074 Div. 4
CFSTI Prices: HC$2.00 MF$0.50

New York Univ., N. Y. School of Engineering and Science.
INVESTIGATION OF THE PREPARATION OF HIGH PURITY METALS VIA THE DECOMPOSITION OF CYCLOPENTADIENYL AND ARENE pi-COMPLEX COMPOUNDS.
Final rept. for 1 Nov 62-31 Oct 64,
by Minoru Tsutsui and Charles J. Marsel.
31 Oct 64, 46p
Contract AF19 628 1685, Proj. 4608, Task 460802
AFCRL 64-934
Unclassified report

See also AD-431 687.

Descriptors: (*Metalorganic compounds, Decomposition), (*Chromium, Metalorganic compounds), (*Nickel, Metalorganic compounds), (*Europium, Metalorganic compounds), Complex compounds, Iodides, Chromium compounds, Nickel compounds, Europium compounds, Synthesis (Chemistry), Purification, Vacuum, Pyrolysis.

This report discusses research on the preparation of high purity metals via the decomposition of cyclopentadienyl and arene- complex compounds. The preparation, purification and characterization of a new europium compound, tricyclopentadienyl-europium, are reported. Experiments relating to the synthesis, purification and decomposition in vapor and liquid phase of chromium and nickel compounds are also described. (Author)

AD-612 130 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Army Research Office, Durham, N. C.
HINDERED ROTATION IN AMINOBORANES,
by John W. Dawson and Kurt Niedenzu. 1964, 11p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64. Volume I, AD-611 432.

Descriptors: (*Boranes, Chemical bonds), (*Amines, Boranes), Organoboranes, Molecular structure, Grignard reactions, Spectra (Infrared), Molecular isomerism, Nuclear magnetic resonance, Atomic orbitals, Chemical analysis, Mathematical analysis.

It is shown that, based on chemical, physicochemical and mathematical evidence, the concept of restricted rotation in aminoboranes. Due to B-N seems well founded.

AD-612 135 Div. 4, 25
CFSTI Prices: HC$1.00 MF$0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
A PARAMAGNETIC RESONANCE STUDY OF NITROGEN ATOMS TRAPPED IN X-IRRADIATED ALKALI AZIDES,
by Frederick F. Carlson. 1964, 14p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Free radicals, Paramagnetic resonance), (*Nitrogen, Free radicals), (*Paramagnetic resonance, Nitrogen), (*Azides, Alkali metal compounds), Potassium compounds, Rubidium compounds, Cesium compounds, Sodium compounds, Crystals, Decomposition, Line spectrum, Nuclear magnetic resonance, X rays.

AD-612 141 Div. 4, 14
CFSTI Prices: HC$1.00 MF$0.50

Army Natick Labs., Mass.
PREPARATION AND USES OF SOME NEW ORGANOLEAD CHEMICALS,
by Malcolm C. Henry. 1963, 9p Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Metalorganic compounds, Lead compounds), (*Lead compounds, Metalorganic compounds), Synthesis (Chemistry), Chemical analysis, Selection, Production, Preparation, Sulfur compounds, Drugs, Fungicides, Rodenticides, Reviews.

A summary is given of a Natick Labs. program involving the synthesis, screening and testing, and large scale production of organolead compounds.

AD-612 145 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa.
PREPARATION OF 5-DINITROMETHYLTETRAZOLE FROM SALTS OF DINITROACETONITRILE,
by F. Einberg. 1963, 12p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference United States Military Academy, West Point, N. Y. 17-19 Jun 1964, Volume I, AD-611 432.

Descriptors: (*N-heterocyclic compounds, Synthesis (Chemistry)), Organic nitrogen compounds, Nitriles, Azides, Salts, Sodium compounds, Ammonium compounds, Molecular structure, Guanidines.

An attempt was made to prepare the previously unknown dinitromethyltetrazole by the reaction of dinitroacetonitrile and sodium azide in water but with negative results probably due to generation of the sodium salt of dinitroacetonitrile and the highly associated hydrazoic acid. This led to an examination of the reactions of salts of dinitroacetonitrile with sodium or ammonium dinitroacetonitrile (but not the potassium salt) with sodium azide and ammonium chloride (mole ratio 1.00: 1.02: 1.02, respectively) in refluxing water but not in dimethylformamide. This appears to be the first example of the use of an organonitrile salt to form a tetrazole and is the first example of a 5-nitroalkyltetrazole.

AD-612 166 Div. 4
CFSTI Prices: HC$2.00 MF$0.50

Edward Davies Chemical Lab., Univ. Coll. of Wales, Aberystwyth.
SPECTROSCOPIC STUDIES: PART 5, THE SPECTRA AND STRUCTURE OF MONOHALOGENO-ACETONITRILES,
by R. G. Jones and W. J. Orville-Thomas.
17 Nov 64, 40p Scientific rept. no. SR-12
Contract AF61 052 691
AFCRL 65-135
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-606 673.

Descriptors: (*Halogen compounds, Nitriles), (*Nitriles, Spectra (Infrared)), (*Infrared spectroscopy, Nitriles), Molecular structure, Band spectrum, Fluorine compounds, Chlorine compounds, Thermochemistry, Chemical bonds, Molecular isomerism, Iodine compounds, Bromine compounds, Great Britain.

The infra-red spectra of a closely related series of acetonitriles were obtained between 5,000 and 500/cm. An analysis of the fine-structure obtained for two fundamentals of fluoro-acetonitrile and of band contours in other cases shows that the molecules have the nitrile structure, XCH2 .CN (X = halogen) and not the alternative ketimine structure XCH = C = NH Frequency assignments were made and structural details deduced in each case. The spectroscopic data were used to calculate thermodynamic data for FCH2 .CN and C1CH2 .CN. (Author)

AD-612 202 Div. 4

Duke Univ., Durham, N. C.
METALATIONS OF CERTAIN BETA-PHENYLETHYL- AND GAMMA-PHENYLPROPYLDIMETHYLAMINES WITH N-BUTYLLITHIUM,
by Rann L. Vaulx, Frank N. Jones, and Charles R. Hauser. 17 Aug 64, 4p
Grant DA AROD31 124G409
AROD 3581:5
Unclassified report

Pub. in Journal of Organic Chemistry (U. S.) v30 p58-60 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Amines, Metalation), (*Metalation, Molecular structure), (*Metalorganic compounds, Synthesis (Chemistry)), (*Lithium compounds, Metalorganic compounds), Aromatic compounds, Spectra (Infrared), Nuclear magnetic resonance.

A study was made of metalation of amines of type C6H5(CH2)nN(CH3)2(I) and C6H5C(CH3)2CH2N(CH3)2(II) with n-butyllithium, and of condensation of the resulting lithioamine with benzophenone. These reactions were realized with (I)(n = 3) and (II) but not with (I)(n = 2 or 4); with (I)(n = 2) dimethylamine was eliminated. (Author)

AD-612 204 Div. 4, 2

Pennsylvania State Univ., University Park.
CHEMICAL PROPERTIES OF C3, A DICARBENE,
by P. S. Skell and L. D. Wescott. 11 Feb 63, 1p
Grant AF AFOSR62 52
AFOSR 65-0375
Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v85 p1023 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Carbon compounds, Chemical properties), (*Comets, Chemical properties), Carbon, Vapors, Alkenes, Chemical reactions, Molecular structure.

The chemical properties are reported of C3, a substance which was first detected in the atmosphere of a comet. Vapor produced in vacuo reacts at a liquid nitrogen-cooled surface with olefins to produce homologs of the parent substance bisethanoallene. Isobutylene reacts with C3 to produce 1,1,1',1'-tetramethyl-bis-ethanoallene (I) in approximately 40% yield. Distillation under high vacuum serves to separate (I) from isobutylene and condensed C, and with gas chromatography a pure product is isolable. A parent peak is observed in a low voltage (15 v.) mass spectrum at 148 mass units. The two CH2 groups in allene should lie in orthogonal planes. The bisethanoallenes derived from C3 and propylene further support this conclusion with an argument based on the number of diastereoisomers. These findings offer a chemical proof that C3 is the major constituent of carbon vapor. (Extracted)

AD-612 205 Div. 4

Purdue Univ., Lafayette, Ind.
THE REACTION OF 1,1-BIS(DIETHYLAMINO)

ETHENE WITH PHENYLMETHANESULFONYL CHLORIDE,
by William E. Truce and Pyong Nae Son. 20 Jul 64, 4p
Contract DA31 124ARO D211; Grant PHS CA04536 06
AROD 3047-8

Unclassified report

Pub. in Journal of Organic Chemistry (U. S.) v30 p71-74 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Amines, Substitution reactions), (*Organic sulfur compounds, Substitution reactions), (*Substitution reactions, Molecular structure), Alkenes, Oxychlorides, Aromatic compounds, Ions.

Phenyljmethanesulfonyl chloride reacts with 1,1-bis (diethylamino)ethene to give a substitution product, whereas ketene diethyl acetal yields a cycloadduct. Some of the factors which appear to be involved in determining the nature of products are discussed. (Author)

AD-612 207 Div. 4

South Carolina Univ., Columbia.
THE EFFECT OF PICRIC ACID AND PYRIDINE ON THE CONDUCTANCE OF AN AMINE N-OXIDE PICRATE IN O-DICHLOROBENZENE AT 25°,
by W. R. Gilkerson and E. K. Ralph, III.
11 Sep 64, 4p
Grant DA ORD31 124 61G51
AFOD 2913-3

Unclassified report

Pub. in American Chemical Society. Journal (U. S.) v87 n2 p175-78 Jan 20 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*N-heterocyclic compounds, Electrical conductance), (*Amines, Electrical conductance), Oxides, Dissociation, Acids, Pyridines, Halogenated hydrocarbons, Aromatic compounds, Acid-base equilibrium, Complex compounds, Reaction kinetics, Phenols.

The conductance of tri-n-butylamine N-oxide picrate was measured as a function of salt concentration in o-dichlorobenzene as solvent at 25C. The addition of picric acid results in a large depression in the conductance of the salt. The addition of pyridine results in large increases in the equivalent conductance of the salt. The results are interpreted in terms of acid-base dissociation of the salt to yield free amine N-oxide and picric acid and formation of a 1:1 complex between the cation from the salt and the amine N-oxide. Analysis of the results indicates that the amine N-oxide is a stronger base, toward picric acid, in this aprotic solvent than is the corresponding amine-just the reverse of the order observed in water. (Author)

AD-612 227 Div. 4, 25, 14

Rensselaer Polytechnic Inst., Troy, N. Y.
Dept. of Chemistry.
MELTING AND PRE-MELTING EFFECTS IN THE ALKALINE EARTH HALIDES,
by G. J. Janz, F. J. Kelly, and Jeanne L. Perano.
7 Jun 63, 7p
Grant AF AFOSR181 63
AFOSR 65-0382

Unclassified report

Pub. in Faraday Society. Transactions (London) v59 pt12 n492 Dec 1963 (Copies available only to DDC users).

Descriptors: (*Melting, Alkaline earth compounds), (*Alkaline earth compounds, Halides), Heat of fusion, Phase studies, Nitrates, Salts, Entropy.

Heats and entropies of fusion, and heat content data for CaBr2, SrCl2, BaCl2 and BaBr2, determined by the method of phase-transition drop calorimetry, are reported. Solid-state transitions were confirmed for SrCl2 and BaCl2, and the possible nature and extent of these transitions are examined. An assessment of the phase-transition properties for the alkaline earth halides and nitrates is developed and the results are discussed relative to pre-melting effects and the process of fusion for these salts. For SrCl2, the relatively small value of the melting and pre-melting effects is note-worthy. (Author)

AD-612 245 Div. 4

Texas Technological Coll., Lubbock.
THE THERMAL DECOMPOSITION OF METAL COMPLEXES. XIII. SOME TETRAMMINEPALLADIUM(II) COMPLEXES,
by W. W. Wendlandt and L. A. Funes. 7 Feb 64, 7p
Grant AF AFOSR23 63
AFOSR 65-0379

Unclassified report

Pub. in Journal of Inorganic and Nuclear Chemistry (Gt. Brit.) v26 p1879-84 1964 (Copies available only to DDC users).

Descriptors: (*Pyrolysis, Complex compounds), (*Complex compounds, Pyrolysis), (*Palladium compounds, Pyrolysis), (*Ammonium compounds, Pyrolysis), Chlorides, Bromides, Iodides, Nitrates, Sulfates, Thermochemistry, Dissociation.

The thermal dissociation of the palladium(II) tetrammine-complexes, Pd(NH3)4X (where X is 2Cl, 2Br, 2I, 2NO3, and SO4), was studied by thermogravimetry, DTA, GE, and by analysis of the pyrolysis products. The complexes, except for the nitrate and sulphate, dissociated to give the trans-diammine-complexes, Pd(NH3)2X. The diammine-iodide and bromide complexes dissociated to give the corresponding anhydrous metal halides, PdX2. The stoicheiometry for the thermal dissociation of the Pd(NH3)2X2 complexes, where X was Cl, Br, and I, was determined. (Author)

AD-612 246 Div. 4

Texas Technological Coll., Lubbock.
THE THERMAL DISSOCIATION OF SOME METAL CUPFERRATE CHELATES,
by W. W. Wendlandt, S. Iftikhar Ali, and C. H. Stembridge. 16 Apr 64, 8p
Grant AF AFOSR23 63
AFOSR 65-0378

Unclassified report

Pub. in Analytica Chimica Acta (Netherlands) v31 p501-8 1964 (Copies available only to DDC users).

Descriptors: (*Complex compounds, Pyrolysis), (*Ammonium compounds, Pyrolysis), (*Pyrolysis, Complex compounds), Thermochemistry, Mass spectrum, Dissociation, Nickel compounds, Copper compounds, Cobalt compounds, Zinc compounds, Cadmium compounds, Manganese compounds, Mercury compounds, Magnesium compounds, Calcium compounds, Barium compounds, Strontium compounds, Aluminum compounds, Iron compounds, Cerium compounds, Lanthanum compounds, Neodymium compounds.

The thermal dissociation of the cupferron complexes

with Cu(II), Ni, Co(II), Zn, Cd, Mn(II), Hg(II), Mg, Ca, Ba, Sr, Al, Fe(III), Ce(III), La, and Nd was studied by differential thermal analysis (DTA) and by pyrolysis into a mass spectrometer. The DTA curves consisted mainly of endothermic peaks although some contained exothermic peaks as well. The mass spectrometer showed that cupferron decomposes slightly above room temperature, giving off N2, NO, N2O, NH3 and H2O. A mechanism for the thermal dissociation of the copper(II) cupferrate is proposed. (Author)

AD-612 252 Div. 4
CFSTI Prices: HC$4.00 MF$0.75

Electrochemistry Lab., Univ. of Pennsylvania, Philadelphia.
ELECTROCHEMISTRY.
Interim technical progress rept. for 7 Feb-6 Nov 64, by E. Gileadi, B. Piersma, A. Damjanovic, and B. Rubin. Jan 65, 102p
Contract DA44 009AMC469T
Unclassified report

Descriptors: (*Electrochemistry, Electrodes), (*Electrodes, Adsorption), Surface properties, Platinum, Hydrocarbons, Sulfuric acid, Solutions, Voltage, Electrolytic cells.

A method of determining the extent of adsorption from solution onto solid metal electrodes was developed and was applied, to the adsorption of ethylene on Pt electrodes from 1 N H2 SO4 solution.

AD-612 271 Div. 4, 14
CFSTI Prices: HC$2.00 MF$0.50

United States Rubber Co., Wayne, N. Y. Research Center.
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES.
Quarterly rept. no. 1, 1 Nov 64-31 Jan 65, by Harold K. Garner, Gerald J. Klender, Aspet Merijanian, and Douglas I. Relyea. 18 Feb 65, 26p
Contract NObs92060, Proj. SR007 03 03, Task 1000
Unclassified report

Continuation of Contracts NObs88232, NObs90089.

Descriptors: (*Heat-resistant plastics, Synthesis (Chemistry)), (*Phosphonitrile chlorides, Polymerization), Quinones, Copolymerization, Electric insulation, Thermosetting plastics, Thermoplastics.

The objective of this investigation is the development of new thermoplastic and thermosetting resins from phosphonitrilic chloride trimer for high temperature electrical applications. The preparation of the tetraphenoxydichlorophosphonitrile trimer was scaled up to yield a total of seven pounds of this monomer. Additional quantities of other monomers were also prepared. Copolymerization of phosphonitriles of reduced functionality has been carried out to give polymers containing the bridging roups -O-, p,p'-OC6H4OC6H4O-, and p,p'-OC6H4C(CH3)2C6H4O-. The introduction of the borate function onto the trimeric phosphonitrile ring has been carried out. (Author)

AD-612 279 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

Tufts Univ., Medford, Mass. Dept. of Chemistry.
A STUDY OF HYDROGENOLYTIC DESULFURIZATION BY MEANS OF HYDRAZINE.
Combined progress rept. nos. 1-4, 1 Oct 62-30 Sep 64, by Vlasios Georgian. 30 Sep 64, 4p
Grant DA ARO D31 124G262
Unclassified report

Descriptors: (*Organic sulfur compounds, Decomposition), (*Hydrazine, Chemical reactions), Acetals, Ketones, Synthesis (Chemistry), Steroids, Stereochemistry, Molecular structure, Chemical bonds.

Several thioketals were prepared incorporating many structural features and the hydrazine defulfuration of these was studied. An interesting tangential development which emanated during the investigations was that of the interaction of cyclo-propane rings with carbonyl functions. Using the steroid molecule to ensure a fixed and discernible stereochemistry, it was possible to establish the principle of conjugative interaction of the electrons of the cyclopropane ring and the pi-system of a carbonyl. Acid catalyzed ring opening of a cyclopropane conjugated with a carbonyl will involve that sigma-electron pair of the three membered ring potentially capable of early overlap with pi-orbital system of the carbonyl group. No other electronic or steric factors loom as important. (Extracted)

AD-612 284 Div. 4
CFSTI Prices: HC$3.00 MF$0.75

Republic Aviation Corp., Farmingdale, N. Y.
APPLICATION OF DIFFERENTIAL SPECTROPHOTOMETRY TO THE STOICHIOMETRY OF ELECTRONIC MATERIALS.
Final rept. 1 May 62-14 Dec 64, by R. S. Kelly, A. Eldridge, E. W. Lanning, and R. Bastian. 14 Mar 65, 85p Rept. no. RAC-615-11
Contract AF19 628 441, Proj. 5620, Task 562003
AFCRL 65-50 Unclassified report

Descriptors: (*Spectrophotometers, Chemical analysis), (*Chemical analysis, Spectrophotometers), Gallium compounds, Arsenides, Bismuth compounds, Tellurides, Potassium compounds, Chromates, Electrical properties, Electronics, Materials, Physical chemistry, Lasers.

Spectrophotometric methods for the analysis of gallium arsenide and bismuth telluride for their major elements, with a precision suitable for stoichiometry studies are developed. Utilizing the EDTA complex, bismuth is determined by direct differential spectrophotometry with a precision (standard deviation) of better than one part per thousand of the amount present. Arsenic, tellurium, and gallium are determined by the technique of indirect spectrophotometry, with a precision in the low parts per ten thousand range. Potassium dichromate is used as the reagent for arsenic and tellurium; gallium is determined by EDTA in the presence of copper. Analyses are presented on synthetic and actual samples of the compounds, including total analyses of gallium arsenide prepared under various arsenic pressures. Some gallium arsenide samples are very close to theoretical in composition, while one sample made under excess arsenic pressure shows an excess of this element in the main body of the ingot. Segregation of the elements in the tail sections of the ingots is evident. Republic suggests that methods for the analysis of gallium arsenide be utilized to see if a correlation can be established between major composition and electronic properties such as laser action. The technique of indirect precision spectrophotometry should also be applied to other electronic material systems. (Author)

AD-612 293 Div. 4, 25
CFSTI Prices: HC$2.00 MF$0.50

Mallinckrodt Chemical Lab., Harvard Univ., Cambridge, Mass.

MICROWAVE SPECTRUM, STRUCTURE, DIPOLE MOMENT, AND QUADRUPOLE COUPLING CONSTANTS OF 1,2,5-OXADIAZOLE,
by A. P. Cox and E. Saegebarth. 1963, 29p
Contract Nonr186614

Unclassified report

Presented in part at the June 1963 Ohio State Symposium on Molecular Structure and Spectroscopy.

Descriptors: (*N-heterocyclic compounds, Molecular properties), (*O-heterocyclic compounds, Molecular properties), (*Microwave spectroscopy, Heterocyclic compounds),(*Molecular structure, Heterocyclic compounds), (*Electric moments, Heterocyclic compounds), Dipole moments, Quadrupole moments, Labelled substances, Deuterated compounds, Center of mass, Band spectrum, Hyperfine structure, Atomic energy levels, Chemical bonds.

The microwave spectra of the normal species (C2H2N2O) and the (C(13)CH2N2O, C2H2N(15)NO, C2D2N2O, and C2HDN2O isotopic species of 1,2,5-oxadiazole (furazan) were assigned. The value of the inertial defect indicates a planar structure for the molecule. The structural parameters obtained from the isotopic changes in the moments of inertia plus the center of mass condition are:O-N = 1.380 ± 0.003 A, C=N = 1.300 ± 0.003 A, C-C = 1.421 ± 0.003 A, C-H = 1.076 ± 0.003 A, NON = 110 degrees 24' ± 20', <ONC = 105 deg. 49' ± 20', <CCN = 108 deg. 59' ± 20', <CCH = 130 deg. 10' ± 35', <NCH = 120 deg. 51' ± 35'. Stark effect measurements gave a dipole moment of 3.38 ± 0.04 D. The nitrogen quadrupole coupling constants of the normal species were determined from an analysis of the hyperfine splittings of four low J Q-branch lines to be: chi-aa = -0.69 ± 0.09 Mc./sec., chi-bb = -0.46 ± 0.13 Mc./sec., chi-cc = 1.15 ± 0.04 Mc./sec. These constants correctly predict the shape and splitting of an additional low J R-branch line. The absence of a low lying vibrationally excited state, the absence of an out-of-plane component of the dipole moment, and the relative intensities of the quadrupole components of the lines of C2H2N2O and C2D2N2O are further evidence for the planarity and C-2v symmetry of the molecule. (Author)

AD-612 328 Div. 4

James Forrestal Research Center, Princeton Univ., N. J.
A REDETERMINATION OF THE LEAD-LEAD SULFIDE EQUILIBRIUM BETWEEN 585 and 920C,
by J. R. Stubbles and C. E. Birchenall. 30 Jun 58, 4p
Contract AF18 600 967
AFOSR 3563

Unclassified report

Pub. in Metallurgical Society of AIME. Transactions (U. S.) v215 p535-8 Jun 1959 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mixtures, Chemical equilibrium), (*Lead compounds, Sulfides), (*Chemical equilibrium, Equations of state), Lead, Sulfides, Control atmospheres, Hydrogen, Hydrogen compounds, Thermodynamics, High-temperature research.

The equilibrium between lead, lead sulfide, and circulating atmospheres of hydrogen and hydrogen sulfide has been measured between 585 and 920C. The equilibrium atmospheres were analyzed by an iodometric method. The data may be represented by a linear free-energy equation, whose enthalpy and entropy terms have associated errors of ± 1 kcal and ± 1 e.u. Reasons are given for accepting the new data in preference to that which already exists. (Author)

AD-612 338 Div. 4, 15

Catholic Univ. of America, Washington, D. C.
COMPLEX CLUSTER INTEGRALS FOR AN AUGMENTED GAUSSIAN GAS,
by Tomoyasu Tanaka, Paul H. E. Meijer, and John N. Fox. 14 Aug 61, 8p
Contract AF49 638 452
AFOSR 2636

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v36 n3 p731-36 Feb 1, 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gases, Mathematical models), (*Integrals, Gases), Statistical mechanics, Equations of state, Determinants, Fourier analysis.

It has been shown by Montroll, Berlin, and Hart that complex cluster integrals can be evaluated very easily if the actual Ursell-Mayer f function is replaced by a Gaussian. The possibility of using a more realistic function was suggested by the same authors. The actual calculation of the cluster integrals was carried out for four particles and the dependence of the parameters on the temperature determined. It is shown that the integration problem is reduced to the evaluation of higher derivatives of the so called graph determinant. The method can also be used to calculate the effective interaction between two articulation points of a complicated cluster. The importance of the nonring diagrams is stressed by some numerical estimates of discrepancy between actual condensation and the divergence of the ring series. (Author)

AD-612 345 Div. 4

Oregon Univ., Eugene.
POLAROGRAPHIC REDUCTION OF SOME ALKYL- AND POLYMETHYLANTHRACENES,
by L. H. Klemm, A. J. Kohlik, and K. B. Desai.
1 May 62, 6p
Contract AF49 638 47[illegible]
AFOSR 2606

Unclassified report

Pub. in Journal of Organic Chemistry (U. S.) v28 p625 30 Mar 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Polycyclic compounds, Polarographic analysis), (*Polarographic analysis, Polycyclic compounds), Reduction (Chemistry), Molecular structure, Electric moments, Stereochemistry, Chemical bonds, Electeochemistry, Ionization potentials, Absorption spectrum, Spectra (Visible and ultraviolet), Synthesis (Chemistry).

AD-612 347 Div. 4, 25

Washington Univ., Seattle.
THIRD- AND FOURTH-ORDER INTERACTIONS OF ARGON WITH A GRAPHITIZED CARBON BLACK. Doctoral thesis,
by J. R. Sams, Jr., G. Constabaris, and G. D. Halsey, Jr.
27 Sep 61, 7p
Contract AF49 638 723
AFOSR 2604

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v36 n5 p1334-9 Mar 1 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Carbon black, Adsorption), (*Argon, Reaction kinetics), Graphite, Mathematical models, Surface area, Thermochemistry.

Data for the third- and fourth-order interactions of argon with the highly graphitized carbon black P33 (2700C) are presented. These data were analyzed by means of a two-dimensional gas model to give an estimate of the interaction energy between the adsorbed atoms, and a new method for determining the surface area of the adsorbent. Relations between the two-dimensional gas model and a model which assumes pairwise additivity of potentials are discussed. (Author)

AD-612 354 Div. 4

Massachusetts Univ., Amherst.
THE DYNAMIC BIREFRINGENCE OF HIGH POLYMERS,
by Richard S. Stein, Shigeharu Onogi, and Daniel A Keedy. 1961, 21p
Grant AF AFOSR61 28
AFOSR 2890

Unclassified report

Pub. in Journal of Polymer Science (U. S.) v57 p801-21 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Polymers, Deformation), (*Refraction, Polyethylene plastics), (*Polyethylene plastics, Refraction), (*Deformation, Polyethylene plastics), Films, Optical properties, Mechanical properties, Relaxation times, Partial differential equations.

The simultaneous measurement of the birefringence and strain of a sample subjected to sinusoidal strain is proposed as a means for elucidating the molecular mechanism of the response of high polymers to mechanical deformation. A linear phenomenological theory is proposed in which strain-optical coefficient distribution functions are assigned to the elastic and viscous members of a distribution of Maxwell elements. An apparatus was constructed to determine the dynamic strain-optical coefficient at frequencies between 0 and 600 cycles/sec. by means of mechanical excitation of vibration at low frequencies and electromagnetic at high frequencies. The dynamic birefringences of polyethylene was studied at room temperature over this frequency range.

AD-612 360 Div. 4
CFSTI Prices: HC$1.00 MF$0.50

TRACOR, Inc., Austin, Tex.
THE INVESTIGATION FOR ALTERNATE METHODS FOR THE SYNTHESIS OF 3-QUINUCLIDINOL AND OTHER AZABICYCLIC ALCOHOLS.
Final rept. for 15 May 63-15 May 64,
by Jimmie S. Payne, Jr. 15 May 64, 16p
Rept. no. TRACOR-64-189-U
Contract DA18 108AMC155A

Unclassified report

Descriptors: (*N-heterocyclic compounds, Alcohols), (*Alcohols, Synthesis (Chemistry)), Photochemistry, Pyridines, Chlorides, Piperidines, Esters, Ions.

An attempt was made to synthesize 3-Quinuclidinol from 4-ethylpyridine using a multiple step sequence in which the last step was the photochemical rearrangement and ring closure of an N-chloro-4-ethylpiperidine derivative. No 3-Quinuclidinol was detected in the products when the alpha-acetoxy- or alpha-hydroxyethylpiperidine derivatives were used. It was postulated that this failure may be due to carbonium ion formation in the acid solvent utilized in the photochemical step. A derivative more resistant to carbonium ion formation, 4 (alpha-methoxyethyl) piperidine, was synthesized, but lack of time prevented its use in the photochemical step. (Author)

AD-612 369 Div. 4, 10, 14
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SYNTHETIC ZEOLITES: THEIR DERIVATION, RESEARCH AND USE (SELECTED ARTICLES),
by A. V. Kiselev, Yu. A. El'tekov, V. N. Semenova, M. B. Vol'f, and R. V. Alekseeva. 12 Feb 65, 18p
FTD-MT-64-451
TT 65-61811

Unclassified report

Edited machine trans. of mono. Sinteticheskie Tseolity: Poluchenie, Issledovanie i Primenenie, Moscow, 1962, p. 218-224, 233-235.

Descriptors: (*Hydrocarbons, Adsorption), (*Thiophenes, Adsorption), (*Gasoline, Adsorption), Polymers, Aliphatic compounds, Aromatic compounds, Separation, Molecular structure, USSR.

Contents:
Adsorption of mixture of thiophene and heptane on zeolite NAA
Use of synthetic zeolite CAA for separation of mixtures of hydrocarbons.

AD-612 408 Div. 4, 22
CFSTI Prices: HC$1.00 MF$0.50

Picatinny Arsenal, Dover, N. J. Explosives Lab.
NITROGEN-15 TRACER STUDIES OF THE NITROLYSIS OF HEXAMETHYLENETETRAMINE,
by Thomas C. Castorina and Joseph R. Autera. 1961, 16p

Unclassified report

Also included in Proceedings of the 1964 Army Science Conferences, United States Military Academy, West Point, N. Y. 17-19 June 1964, Volume 1.

Descriptors: (*Amines, Decomposition), (*HMX, Synthesis (Chemistry)), (*RDX, Synthesis (Chemistry)), Labelled substances, Radioactive isotopes, Nitrogen, Ammonium compounds, Nitrates, Chemical precipitation, Molecular structure, Exchange reactions, Chemical equilibrium, Tracer studies.

A description is given of investigations concerning the participation of ammonium nitrate in the formation of HMX and RDX by the nitrolysis of hexamethylene tetramine.

AD-612 425 Div. 4, 14
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
PHOTODEGRADATION OF HIGH POLYMERS.
PART V. PHOTOLYSIS OF POLY(ALKYLENE POLYSULFIDES) IN VACUUM.
Interim rept.,
by L. G. Isaacs and R. B. Fox. 4 Feb 65, 18p
Rept. no. NRL-6202
Proj. S49293G

Unclassified report

Descriptors: (*Polyethylene plastics, Degradation), (*Polymers, Photochemistry), (*Photochemistry, Polymers), Sulfides, Weight, Space environmental conditions, Simulation, Environmental tests, Hydrogen compounds, Vacuum, Decomposition, Carbon compounds, Ultraviolet radiation, Communication satellites (Passive), Films.

The rates of weight loss of several poly(alkylene polysulfides) during exposure to a simulated space environment were measured and compared to the rates of weight loss of several nonsulfur containing polymers. The products of degradation of poly(methylene disulfide and tetrasulfide) and poly(ethylene disulfide and tetrasulfide) were identified and gaseous products were quantitatively measured. The major products of degradation were hydrogen sulfide, carbon monosulfide (which polymerizes on surfaces within the exposure cell), and, for the methylene polymers, carbon disulfide. The tetrasulfide polymers deposited a rubbery film on the walls of the exposure cell which was spectroscopically identical to exposed poly(alkylene tetrasulfide). A mechanism of degradation compatible with these results is suggested. (Author)

5. Communications

AD-611 528 Div. 5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INTERFERENCE RESISTANCE OF TRANSMISSION OF REMOTE CONTROL COMMANDS WITH THE USE OF DUPLICATION AND ACCUMULATION,
by B. Ya. Sovetov. 5 Feb 65, 14p FTD-TT-64-935
TT 65-61773

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Priborostroenie (USSR) 1963, v. 6, no. 4, p. 30-37.

Descriptors: (*Remote control systems, Interference), Coding, Errors, Reliability, Probability, USSR.

AD-611 767 Div. 5, 30
CFSTI Prices: HC$3.00 MF$0.75

Bolt, Beranek and Newmann, Inc., Cambridge, Mass.
METHODS FOR PSYCHOACOUSTIC EVALUATION OF SPEECH COMMUNICATION SYSTEMS.
Final rept.,
by Carl E. Williams, Michael H. L. Hecker, and Karl D. Kryter. Dec 64, 54p Rept. no. BBN-1212
Contract AF19 628 382, Projs. 2808, 7682, Task 768202
ESD TDR-65-153

Unclassified report

Descriptors: (*Voice communication systems, Tests), (*Intelligibility, Voice communication systems), (*Speech, Intelligibility), (*Psychoacoustics, Test methods), Personnel, Verbal behavior, Identification, Sound transmission, Speech representation, Human engineering, Sound reproduction systems, Psychophysiology, Sensitivity, Reliability, Factor analysis, Performance (Engineering).

A review is presented of research conducted in the development and evaluation of a 'Modified Rhyme Test' for the measurement of the intelligibility of speech transmitted over communication systems. This new multiple-choice intelligibility test is suitable for both laboratory and field use. Statistics concerning reliability and sensitivity of the test as a function of the number of listeners and the number of test repetitions are presented. The results of a series of experiments concerned with some of the variables involved in the development of a speaker identification test for the evaluation of speech communication systems are described in detail. (Author)

AD-611 878 Div. 5, 8
CFSTI Prices: HC$3.00 MF$0.75

Mitre Corp., Bedford, Mass.
PULL-IN PERFORMANCE OF FIRST-ORDER PHASE-LOCKED LOOPS,
by Peter Bratt. Feb 65, 72p Rept. no. W-06943
Contract AF19 628 2390, Proj. 705 2
ESD TDR-64-640

Unclassified report

Descriptors: (*Phase-locked communication systems, Phase measurement), Phased-locked systems, Signals, Propagation, Time, Signal-to-noise ratio, Statistical analysis, Statistical functions.

A phase-locked loop is briefly described, together with the derivation of the basic differential equation which governs the dynamic behavior of the loop during the pull-in process. The special case of the pull-in process of the first-order loop when a sine wave of constant frequency is applied to the input of the loop is also described. The relationship between the frequency mistuning of the loop, the initial starting phase angle of the input sine wave, and the time required for the loop to pull in is discussed. The statistical parameters associated with the pull-in time is reviewed. In particular, expressions are given for the probability density function of the pull-in time and the cumulative distribution of the pull-in time. (Author)

AD-612 053 Div. 5, 18
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
DIGITAL COMMUNICATIONS AND EDP FOR AN ADVANCED TACTICAL AIR CONTROL SYSTEM: A PRELIMINARY STUDY.
Memo.,
by G. M. Northrop. Jan 65, 27p Rept. no. RM-4431-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Tactical Air Command, Data transmission systems), (*Command and control systems, Tactical Air Command), (*Communication theory, Tactical Air Command), (*Data processing systems, Tactical Air Command), Air Force operations, Fire control systems, Digital systems, Communication systems, Ground support equipment, Weapon systems, Military tactics, Feasibility studies.

The discussion outlines some characteristics of the present Tactical Air Control System, highlights some difficulties that might occur with the introduction of digital data processing into the system, and suggests means of avoiding these difficulties. A three-phase program of equipment acquisition is outlined. The concept described has potential for very broad application. Possible areas of utility include air traffic control, ground control of attack aircraft (forward air controller to aircraft), request nets for all aspects of preplanned and immediate air support, and so forth. A coded message concept for an Advanced Tactical Air Control System is illustrated by discussing its application in the context of immediate requests for close air support.

AD-612 076 Div. 5, 8
CFSTI Prices: HC$6.00 MF$1.50

Mitre Corp., Bedford, Mass.
A STUDY OF NON-STANDARD TELEMETRY SYSTEM CHARACTERISTICS.
Sep 64, 264p Rept. no. TM-04093/0000/00/0/00
Contract AF19 628 2390, Proj. 705 4, Task 5931 14
ESD TDR64-155

Unclassified report

See also AD-284 370.

Descriptors: (*Telemeter systems, Standards), Frequency, Time, Radiofrequency, Pulse communication systems, Frequency modulation, Pulse modulation, Air Force.

This document reports on a portion of the studies conducted under the first phase (Phase I) of a two-phase program, and has as its basic purpose the establishment of backup documentation for coping with a great number

of deviations from the IRIG (Inter-Range Instrumentation Group) Telemetry Standards. Data obtained from the Air Force, Army, Navy and NASA relative to deviations from the Standards is categorized and summarized. Deviations in Frequency Division Systems, Time Division Systems, Pulse Code Systems and Radio Frequency Systems as well as Modulation Formats are analyzed. Extreme deviations from the Standards are covered under the general heading of Odd-Ball Requirements. Approximately 1000 deviations were found in 140 programs. Recommendations are made concerning suggested revisions to the Standards and specific studies to be conducted in the second phase (Phase II) of this program. (Author)

AD-612 143 Div. 5, 12, 30
CFSTI Prices: HC$1.00 MF$0.50

Army Satellite Communications Agency, Fort Monmouth, N. J.
ARMY PARTICIPATION IN PROJECT SYNCOM,
by J. Wilson Johnston. 1964, 22p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y. 17-19 Jun 1964, Volume 1, AD-611 432.

Descriptors: (*Communication satellites (Active), Synchronous satellites), (*Army research, Communication satellites (Active)), (*Global communication systems, Communication satellites (Active)), Radio relay systems, Scientific research, Test facilities, Test equipment (Electronics), Reviews.

The SYNCOM spacecraft is a synchronous altitude satellite. It is shown on this slide. The satellite was built by the Hughes Aircraft Corporation. It is about 28 inches in diameter and weights about 85 pounds in orbit. It carries, in addition to communications gear, a small 'on board' propulsion system for orbital corrections. The ground communications support for this project was developed, engineered, installed and operated by the Army. The complex consists of fixed terminals at Fort Dix, New Jersey and Camp Roberts, California, several transportable terminals and one seaborne terminal, the U.S. Naval Ship Kingsport.

AD-612 264 Div. 5, 8, 32
CFSTI Prices: HC$5.00 MF$1.00

Syracuse Univ., N. Y.
SPEECH COMMUNICATIONS FROM AN INFORMATION THEORY VIEWPOINT.
Doctoral thesis,
by John David Griffiths. Jan 65, 164p
Contract AF33 508 1116; Grant NSF GP1137
Unclassified report

Descriptors: (*Voice communication systems, Optimization), (*Speech, Analysis), (*Communication theory, Speech), Speech representation, Auditory signals, Vocabulary, Language, Signal-to-noise ratio, Analog systems, Design, Noise, Probability, Bibliographies.

Speech is treated as a sequence of discrete code elements, the phonemes. The entropy of phonemes and spoken words is examined as a function of the length of intersymbol influence and size of spoken vocabulary. Bounds for word entropy are established in certain cases. Using the known perceptual cues of the phonemes and their characteristics, a decision sequence is constructed to uniquely determine any phoneme. Using the spectral composition of these cues as reported in the literature permits the calculation of an 'information spectral density' for each phoneme. Using the information rate spectral density and the power spectral density of speech an optimum linear filter for processing speech prior to transmission through a power limited channel with additive Gaussian noise is derived. If the noise is also white and small compared to the signal, the square of the absolute value of the filter transfer function is found to be proportional to the information rate spectral density divided by the speech power spectral density. A new approach to the design of non-linear filters (amplitude limiters) for speech is also discussed.

AD-612 428 Div. 5, 18
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MILITARY RADIO COMMUNICATIONS EQUIPMENT TRADE-OFFS,
by Delmer C. Ports, J. J. Crenca, and K. Heisler.
12 Jun 59, 20p Rept. no. P-1724
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Radio communication systems, Military requirements), Radio equipment, Design, Costs, Correlation techniques, Systems engineering.

This paper describes the development of empirical relationships of design-cost based on the characteristics of a comparatively large-number of existing and developmental military radio communications equipments. The use of such relationships in the construction of performance-cost trade-offs is illustrated. The work was carried out as part of a larger research effort designed to study all of the relationships required for communication system planning. Preliminary study indicated that for most types of existing and developmental military radio equipment, given power output only, a cost estimate may be obtained which is accurate within a factor of about three. If a second parameter is specified such as type of installation, frequency range, or type of modulation, an estimate accurate to within a factor of about 1.5 may be obtained.

6. Detection

AD-611 564 Div. 6, 25
CFSTI Prices: HC$6.00 MF$1.50

Technical Research Group, Melville, N. Y.
THEORETICAL STUDY OF RESONANT STIFFENING DEVICES,
by David Yarmush. Apr 64, 271p
TRG-142-TN-64-10
Contract Nonr320800

Unclassified report

Descriptors: (*Sonar, Vibrators (Mechanical)), (*Vibrators (Mechanical), Resonance), Rods, Metal plates, Vibration, Acoustics, Vibration isolators, Underwater sound, Oscillation, Pistons, Boundary layer, Green's function, Matrix algebra, Frequency, Transducers, Wave transmission, Mechanical waves.

The vibration properties of a plate or a rod with attached mechanical structures, called resonators, are studied by transfer matrix and Green's function techniques. The plate may be in a vacuum, or acoustically coupled to water on one side. The effects of an added resonator at a given frequency depend only on its response strength in each of its modes of vibration. Expressions are derived for the strengths of several useful resonator types. Boundary conditions for the plate, such as clamping or simple support, are satisfied by the mathematical device of attaching resonators of infinite strength. A piston cut out of the plate material is handled similarly. Formulas for the interactions 'influence coefficients' between the modes of different resonators are given. Expansions are developed for the transcendental integrals that arise in the problems treated. (Author)

AD-611 802 Div. 6, 8
CFSTI Prices: HC$5.00 MF$1.00

General Electric Co., Syracuse, N. Y. Electronics Lab.
INVESTIGATION OF AFCRL TRI-COORDINATE RADAR TECHNIQUE.
Final rept. for Mar 62-Dec 64,
by E. R. Wingrove, Jr. 15 Dec 64, 160p
Rept. no. R65ELS-26
Contract AF19 628 335, Proj. 4600, Task 460002
AFCRL 65-8

Unclassified report

Descriptors: (*Search radar, Radar antennas), (*Radar antennas, Search radar), Radar reflections, Angle of arrival, Phase measurement, Phase control devices, Amplifiers, Phase detectors, Plan position indicators, Circuits, Power supplies, S band, Wiring diagrams, Feasibility studies.

An experimental Tri-Coordinate Radar System, based on a special antenna developed at the Air Force Cambridge Research Laboratory, has been assembled at AFCRL's Antenna Test Station. This report begins with an explanation of how the antenna converts elevation angle of arrival to an electrical phase difference, followed by a block diagram description of the complete radar. Then each of the units which make up the receiving system is individually discussed. The phase-stable limiting amplifiers, developed specifically for this application, receive particular attention. Next, a detailed block diagram explanation of the indicating system is given, followed by descriptions of the indicator circuits. In each case, complete schematic diagrams are given, accompanied by sufficient information to permit operation and maintenance of the equipment. Preliminary testing of the system with an aircraft target has shown the feasibility of the concept, but has also shown the need for additional study. The report concludes with recommendations for further experimental and theoretical investigation. (Author)

AD-612 091 Div. 6, 18, 30
CFSTI Prices: HC$5.00 MF$1.00

Aeronutronic, Newport Beach, Calif.
ACQUISITION COORDINATE COMPUTATION FOR TRACKING AND SURVEILLANCE SENSORS PROGRAM DOCUMENT,
by R. G. Schinnerer and D. R. Thompson. Dec 64, 153p Publication rept. no. U-3011
Contract AF19 628 3438
ESD TDR-65-160

Unclassified report

Descriptors: (*Programming (Computers), Tracking), (*Tracking, Satellites (Artificial)), (*Space surveillance systems, Programming (Computers)), Orbital trajectories, Mathematical prediction, Digital computers, Data processing systems.

The Observing Schedule Program (OBSERV) is programmed for the Philco 2000 computer and is to be part of the B-3 Semi-Automatic Program System (SPS) at the SPADATS Center in Colorado Springs, Colorado. It functions in conjunction with the Executive Program and receives its input from the Schedule, SEAI and FAN input tapes. OBSERV has been developed to compute sets of acquisition coordinates for stations with fixed beam surveillance devices and sensors that can track satellites. The capability to handle phased array trackers of the AN/FPS-85 type has also been included. For surveillance devices, the program computes the time and coordinates of beam penetration by all satellites requested on the input tape. For tracking devices, the program calculates acquisition coordinates at evenly spaced intervals of time, as specified by the input, during the periods that a satellite is within the tracker coverage.

AD-612 151 Div. 6
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SMOOTHING AND PROCESSING OF SIMULATED AMRAD TRAJECTORY DATA.
Group rept.,
by A. Bertolini and S. F. Catalano. 21 Jan 65, 36p
Rept. no. 1965-7
Contract AF19 628 500ARPA Order 498
ESD TDR-65-33

Unclassified report

Descriptors: (*Radar tracking, Signal-to-noise ratio), Guided missile trajectories, Simulation, Guided missile tracking systems, Numerical methods and procedures.

In this report, an attempt is made to determine suitable smoothing intervals to be used in the smoothing of radar trajectory data. This is done by using different fitting intervals in the smoothing of simulated noisy trajectory data of different signal-to-noise ratios. The errors, or differences between the true noiseless data and the smoothed noisy data, were observed and plotted. Minimum errors were obtained when the range smoothing interval was approximately 1 to 2 seconds and the elevation and azimuth smoothing intervals 10 seconds. The plots suggest that elevation and azimuth errors can be further reduced by smoothing over intervals longer than 10 seconds but this would not be practical in many

actual missile shots. (Author)

AD-612 156 Div. 6, 12
CFSTI Prices: HC$2.00 MF$0.50

Aeronutronic, Newport Beach, Calif.
ASTRODYNAMIC RESEARCH AND COMPUTER PROGRAMS.
Final rept.
Jan 65, 36p Publication rept. no. U-3033
Contract AF19 628 3393
ESD TDR-65-170
Unclassified report

See also AD-611 140.

Descriptors: (*Satellites (Artificial), Tracking), (*Tracking, Satellites (Artificial)), (*Identification systems, Satellites (Artificial)), Data processing systems, Programming (Computers), Space surveillance systems, Corrections, Orbital trajectories, Perturbation theory, Drag.

The areas of liaison and direct support, on-site data processing, and SPADATS (Space Detection And Tracking System) Control Center data processing are reported, in response to the contract work statement. (Author)

AD-612 161 Div. 6, 12
CFSTI Prices: HC$1.00 MF$0.50

White Sands Missile Range, N. Mex.
ACCURACY AND INFORMATION RATE STUDIES ON TARGET CROSS SECTIONS UTILIZING THE NIKE HERCULES RADARS,
by Gabriel E. Galos. 1964, 14p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I.

Descriptors: (*Guided missiles, Radar tracking), (*Radar tracking, Radar echo areas), (*Radar echo areas, Guided missiles), Monopulse radar, X band, Recording systems, Pulse rate, Intermediate frequency amplifiers, Automatic gain control, Signal-to-noise ratio, Errors, Antimissile defense systems.

Studies indicate that log pulse height information at the repetition rate of the radar must be used in order to determine the detailed statistical characteristics of missile targets. On the other hand long term (order of 1 second) average characteristics can be determined by use of automatic gain control (AGC) data alone. For slowly fluctuating targets, the AGC data is quite adequate. The overall accuracy of the determination of radar cross section is dependent on range and signal to noise ratio. The best estimates are given of errors for a radar cross section measurement program utilizing the Nike Hercules target track radar. (Author)

AD-612 213 Div. 6, 2

Seismological Lab., Calif. Inst. of Tech., Pasadena.
DETERMINATION OF SOURCE PARAMETERS OF EXPLOSIONS AND EARTHQUAKES BY AMPLITUDE EQUALIZATION OF SEISMIC SURFACE WAVES. 1. UNDERGROUND NUCLEAR EXPLOSIONS.
Revised ed.,
by M. N. Toksoz, A. Ben-Menahem, and D. G. Harkrider.
6 Jul 64, 12p
Contract AF49 638 1337 Unclassified report
Pub. in Journal of Geophysical Research (U. S.) v69 n20 p4355-66 Oct 15 1964 (Copies not available to DDC or Clearinghouse customers).
Revision of rept. dated 25 May 64.

Descriptors: (*Seismology, Underground explosions), (*Nuclear explosions, Seismology), (*Earthquakes, Seismology), Explosion effects, Seismic waves, Propagation, Identification systems, Correlation techniques, Geophysics.

A method of determining the source parameters of explosions and earthquakes from the amplitude spectrums of seismic surface waves is described. The method, called amplitude equalization, involves the correction of the ground displacement spectrum for the propagation effect. This is accomplished by multiplying it numerically with the inverse of the frequency response of the layered medium. The result is the amplitude spectrum of the source function, which may be interpreted by itself or jointly with the initial phase spectrum to determine the source-time variation. The spectrums of the Rayleigh waves from underground nuclear explosions are compared and the source-time function is interpreted using the amplitude equalization method. The time variation of the pressure pulse at the boundary of the elastic zone is found to be of the form p(t) = P sub O te (-eta t), where eta is a parameter which depends on the yield of the explosion and on the medium. For the events studied, the breadth of the pulse increased (eta decreased) with the yield of the explosion. (Author)

AD-612 359 Div. 6, 18, 25
CFSTI Prices: HC$5.00 MF$1.00

Electro-Optical Systems, Inc., Pasadena, Calif.
OPTICAL SURVEILLANCE COMPONENT TECHNIQUES.
Final rept. for 22 Oct 62-22 Nov 63,
by Paul C. Fletcher, Mani L. Bhaumik, David L. Weisman, Burt L. Cooke, and David L. Fridge.
Jan 65, 173p Rept. no. EOS-3460-F
Contract AF30 602 2914, Proj. 4506, Task 450608
RADC TDR-63-557 Unclassified report

Descriptors: (*Space surveillance systems, Lasers), (*Lasers, Space surveillance systems), (*Optical equipment, Space surveillance systems), (*Defense systems, Space surveillance systems), Doppler systems, Oscillators, Power amplifiers, Gases, Europium, Neodymium, Calcium compounds, Tungsten compounds, Oxygen compounds, Fluorescence, Quantum mechanics, Stability, Amplitude modulation, Frequency modulation, Modulators, Targets, Simulators, Detection.

The techniques and components necessary for the implementation of an optical Doppler surveillance system are discussed. Specifically, the requirements of an optical transmitter are set down. Efforts to use chelates to achieve both a gaseous narrow band oscillator and a high power amplifier are described. The description of lasering action in several chelates of europium is included with the theory of why some chelates lase and others do not. The incorporation of an oscillator and an amplifier into a transmitter is described using Nd:CaWO4 as the oscillator and Nd glass as the amplifier. Gains of 10 db were achieved in a single-pass amplifier, which is 8 inches long and pumped with 6000 joules. The problems of isolation of the oscillator and amplifier are discussed and a breadboard model of a Faraday isolator using flint glass was built with greater than 30 db isolation and less than 1 db insertion loss. In addition to the transmitter problems, the problems of optical heterodyne receiving are discussed. Measurements on mono-moding of lasers, stability and stabilizing of lasers, modulation of lasers by end reflectors variation, for both amplitude and frequency modulation are discussed. A description of a possible wide band heterodyne receiver is presented. (Author)

7. Electrical Equipment

AD-611 506 Div. 7, 14, 25

National Electrotechnical Inst., Turin (Italy).
ELECTROLUMINESCENCE OF ZnS EXCITED WITH LINEAR VOLTAGE TRANSIENTS,
by G. Bonfiglioli, P. Brovetto, and C. Cortese. 1962, 8p
Contract AF61 052 328
AFOSR 3767
Unclassified report

Pub. in mono. Luminescence of Organic and Inorganic Materials, New York, p605-12 1962 (Copies available only to DDC users).

Descriptors: (*Zinc compounds, Sulfides), (*Electroluminescence, Excitation), Transients, Voltage, Phototubes, Collimators, Test methods, Italy.

A technique is described for exciting electroluminescence by means of single transients having a constant derivative in time. Results obtained by the use of the method on ZnS commercial cells of the condenser type are reported.

AD-611 535 Div. 7, 25
CFSTI Prices: HC$5.00 MF$1.25

General Electric Co., Auburn, N. Y.
RESEARCH ON THIN FILM POLYCRYSTALLINE SOLAR CELLS.
Final rept. for 1 Sep 62-31 Dec 64,
by Richard W. Aldrich and Dominic A. Cusano.
Feb 65, 193p
Contract AF33 657 10601, Proj. 8173, Task 817301
APL TR-65-8
Unclassified report

See also AD-438 526

Descriptors: (*Solar cells, Films), (*Cadmium compounds, Tellurides), Semiconductors, Single crystals, Vapor plating, Molybdenum, Manufacturing methods, Impurities, Powders, Diodes (Semiconductor), Gold, Electric connectors, Encapsulation, Silicon coatings, Metal coatings, Plastic coatings, Oxides, Heat treatment, Voltage, Indium compounds, Copper compounds, Selenides, Storage, Environmental tests.

Large-area (56 sq cm) cells that were 4.6% efficient and a solar panel - 1/2 sq ft in area - were fabricated. On the average, the efficiency, the power output per unit weight, and the yield of large area solar cells made from cadmium telluride films all increased monotonically during the contract period (1 September 1962 to 31 December 1964). The composite objective for the run of the contract was the development of lightweight, flexible, solar cells of approximately 5% maximum efficiency. The semiconductor material was to be polycrystalline cadmium telluride. The cells were to withstand, or show promise of withstanding, without deterioration a normal laboratory environment, particle and ultra-violet radiation, high and low temperatures, and vacuum. The various investigations that were undertaken to achieve such large area cells are discussed in detail in this report. The investigations include studies of photovoltaic junctions, film growth techniques, collector electrodes, collector busbars, and capsulation techniques. (Author)

AD-611 558 Div. 7
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., West Lynn, Mass.
A NEW HIGH PERFORMANCE FUEL CELL EMPLOYING CONDUCTING-POROUS-TEFLON ELECTRODES AND LIQUID ELECTROLYTES,
by L. W. Niedrach and H. R. Alford. 1964, 32p
Contract DA44 009AMC479T, Proj. P4980; ARPA Order 247
Unclassified report

Rept. on Saturated Hydrocarbon Fuel Cell Program.

Descriptors: (*Fuel cells, Halocarbon plastics), (*Halocarbon plastics, Electrodes), Electrolytic cells, Gases, Electrolytes, Sulfuric acid, Potassium compounds, Hydroxides, Oxidizers, Oxygen, Air, Surface properties, Platinum, Catalysts, Performance (Engineering), Hydrogen, Electrical conductance.

A low temperature, aqueous electrolyte fuel cell employing new, Conducting-Porous-Teflon Electrodes is described. The new electrodes show excellent performance characteristics with a variety of fuels (including hydrocarbons) and with both oxygen and air as the oxidant. Preparation methods are discussed, and performance data obtained with ambient temperature, hydrogen-oxygen and hydrogen-air cells are presented to illustrate their properties. (Author)

AD-611 748 Div. 7
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
DIRECT PRODUCTION OF ELECTRICAL PULSES FROM GALVANIC CELLS I,
by Herbert F. Hunger, James E. Wynn, and Nunzio J. Sanfilippo. Oct 64, 30p Technical rept. ECOM-2520
Proj. 1L0 13001A91A, Task 1L0 13001A91A12
Unclassified report

Descriptors: (*Electrolytic cells, Pulse generators), (*Pulse generators, Electrolytic cells), Electrolytes, Electrodes, Anodes (Electrolytic cell), Formaldehyde, Platinum, Sulfuric acid, Alcohols, Electric currents, Voltage, Oscillation, Electrochemistry, Hydrogen, Electrodeposition, Diffusion, Chemical reactions.

An experimental method was found to study the oscillatory behavior of anodic half elements in combination with a simulated, electromotively active counter electrode. The half elements under investigation were methanol and formaldehyde at platinized platinum electrodes and room temperature in sulfuric acid electrolyte. Simultaneous current and voltage oscillations of various amplitudes and frequencies were observed. Various waveforms of the oscillations were found and classified in oscillation patterns. A reaction mechanism explaining the oscillatory behavior has been suggested. Based on the theory that at least two simultaneous reactions are necessary for a periodic reaction to occur, two possible reactions were identified. Experimental evidence in support of the suggested mechanism is presented. A correlation between electrode activity and time effects on the oscillatory behavior of the half elements was established. Influence of electrode pretreatment (hydrogen deposition) on the oscillations was also investigated. (Author)

AD-611 750 Div. 7, 2, 8
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.

ICING AND SNOW ACCRETION ON ELECTRIC WIRES,
by Daisuke Kuroiwa. Jan 65, 16p
Research rept. no. RR-123
Task 8X99 27 001 03

Unclassified report

Descriptors: (*Electric wires, Ice), (*Ice, Electric wires), (*Snow, Electric wires), Antennas, Failure (Mechanics), Meteorology, Correlation techniques, De-icing systems, Japan.

Experimental data on icing and snow accretion on electric wires and antennas is presented. The accumulation of supercooled droplets on a single wire stretched in an air flow has been calculated as icing in the form of soft rime, hard rime, and glaze, per unit time and unit length of wire. The difference between calculated values and observed values in Japan is discussed in terms of ice deposit, wire tension, and wind velocity and pressure. Iced wire will be cut more often by dynamic wind pressure than by the deposited ice load. The differences between icing and accretion of snow are discussed, the wire failures being attributed to the heavy weight of snow accretion. This phenomenon will be less frequent in polar regions than in temperate regions because the main cause of snow accretion-existence of liquid-water film on the surface of snow flakes--is less prevalent. A simple experiment for anti-icing an electric wire by means of electrical heating is briefly described. (Author)

AD-611 850 Div. 7
CFSTI Prices: HC$2.00 MF$0.50

Inland Testing Labs., Dayton, Ohio.
ALKALINE CELL EVALUATION AND ANALYSIS.
Quarterly technical progress rept. no. 3, 15 Nov 64-15 Feb 65,
by P. R. Voyentzie. 15 Feb 65, 35p
Contract AF33 615 1580, Proj. 8173, Task 817304

Unclassified report

Descriptors: (*Alkaline cells, Reliability), Storage batteries, Performance (Engineering), Hermetic seals, Electrical properties, Batteries and components, Cadmium, Nickel, Silver, Zinc.

The purpose of this program is to determine the actual failure mechanism of all components of alkaline storage batteries and to determine techniques and materials to prevent these premature failures, and to devise analytical methods for predicting the life of cells under any environmental condition. The program is also concerned with determining methods for gas suppression and the hermetic sealing of alkaline cells. Toward this end, the program has been separated into five (5) different parts. These five (5) parts are: (1) Investigation of Seals; (2) Investigation of Cell Operating Variables; (3) Investigation of Memory Effects; (4) Investigation of Variables; (5) Evaluation of New or Improved Cells.

AD-612 008 Div. 7, 14, 17, 26

Andrew Corp., Orland Park, Ill.
APPLIED RESEARCH AND DEVELOPMENT OF HIGH TEMPERATURE, HIGH POWER RF COAXIAL TRANSMISSION LINES: BROADBAND, LOW ATTENUATION, SEMI-FLEXIBLE.
Rept. for 15 May 60-30 Sep 62,
by H. L. Woodbury. Jan 65, 253p
Contract AF33 616 7389, Proj. 4156, Task 415602
ASD TDR-62-976

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Coaxial cables, Heat-resistant materials), Radiofrequency cables, Broadband, Cable grips, Attenuation, Dielectrics, Electric insulation, Quartz, Halocarbon plastics, Silicon compounds, Dioxides, Helixes, Nickel alloys, Silver, Copper, Cladding, Pressure, Nitrogen, Halogenated hydrocarbons, Air, Coolants.

Two high temperature, low-loss, coaxial cables were developed for operation in the -65 to 350C and -100 to 825C ranges. These cables were developed primarily for use on aircraft, missiles and space vehicles. The semi-air dielectric coaxial cables are produced by a continuous process which consists of spirally wrapping a quartz-filled teflon or braided silica insulator on the inner conductor. The outer conductor is formed from accurately sized silver-clad Inconel or OFHC copper strip. The inner and outer conductors use specially developed metallurgically bonded silver-clad materials that assure a high conducting level at the maximum operating temperatures with good mechanical properties. The two RF transmission lines consist of cable, associated connectors, and pressurization accessories.

AD-612 027 Div. 7, 8
CFSTI Prices: HC$6.00 MF$1.50

Consolidated Systems Corp., Pomona, Calif.
INSTRUMENTATION GROUNDING AND NOISE MINIMIZATION HANDBOOK.
Jan 65, 250p
RPL TR-65-1

Unclassified report

Descriptors: (*Electrical engineering, Handbooks), (*Ground (Electrical), Handbooks), (*Noise (Radio), Reduction), (*Radio interference, Reduction), Noise generators, Power supplies, Transmission lines, Electromagnetic waves, Atmospherics, Electromagnetic shielding, Test facilities, Instrumentation, Digital systems, Analog systems.

Material presented in this handbook is general in nature with sufficient information given that an instrumentation engineer or a facility power engineer may apply to his more detailed requirements the fundamentals necessary which will produce a low noise and high accuracy data acquisition system. The information is primarily directed toward modern digital data acquisition systems. Analog systems are considered and details are given for the proper grounding of these devices relative to the elimination of common-mode voltages. This handbook provides a common reference for the solution of grounding problems in instrumentation systems and in power systems where the power system is installed nearby and for the purpose of supplying primary power to the data facility.

AD-612 189 Div. 7, 4
CFSTI Prices: HC$4.00 MF$0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
LITHIUM-SILVER-CHLORIDE SECONDARY BATTERY INVESTIGATION.
Final rept. for Dec 63-Nov 64,
by J. E. Chilton, Jr., W. J. Conner, G. M. Cook, and R. W. Holsinger. Feb 65, 109p
Contract AF33 615 1195, Proj. 8173, Task 817304 10
APL TR-64-147

Unclassified report

Descriptors: (*Storage batteries, Design), (*Lithium compounds, Chlorides), (*Silver compounds, Chlorides), Electrolytes, Batteries and components, Electric connectors, Seals (Stoppers), Halocarbon plastics, Aluminum, Alkenes, Lithium, Electrodeposition, Electrodes, Thermochemistry, Polyethylene plastics.

Aluminum cases for housing the lithium-silver chloride-nonaqueous electrolyte cell system were prepared using an improved seal assembly technique. Propylene carbonate electrolyte conductivity may be increased by the addition of solvents such as ether and toluene. The electrodeposition of propylene lithium from 50 vol % solutions of these solvents with propylene carbonate LiCl and AlCl3 occurs at high efficiency. Silver chloride electrodes have been prepared by pasting a mix of 75% AgCl and 90% AgCl with 10% acetylene black. Cell heat measurements yield thermodynamic values for the postulated cell reaction of free energy, heat of reaction, and entropy which are within experimental accuracy equal to the theoretical values calculated for the following cell reaction with cell reactants and products in solid state: Li + AgCl yields LiCl + Ag. Lithium-silver chloride cell cycle life is improved at high temperature. A cell was constructed with electrodes sealed in a polyethylene case which had an energy density of 88 watt-hr/lb at 0.22 na/sq cm current density.

AD-612 190 Div. 7, 8
CFSTI Prices: HC$3.00 MF$0.50

Westinghouse Research Center, Pittsburgh, Pa.
A PRACTICAL HANDBOOK FOR LOCATION AND PREVENTION OF RADIO INTERFERENCE FROM OVERHEAD POWER LINES,
by W. E. Pakala. 8 Oct 64, 52p
Rept. no. 64-9E4-565-R1
Unclassified report

Descriptors: (*Transmission lines, Radio interference), (*Radio interference, Identification), Handbooks, Electric cables, Electrical conductance, Electric insulation, Electrical equipment, Antennas, Control systems.

Contents (handbook for location, reduction and prevention of radio interference from overhead power lines):
Description of interference and discussion of important characteristics.
Sources of interference on lines: Conductors; insulators; hardware; switchgear and Other Line Apparatus; utilization equipment; and foreign lines and equipment.
Location of power line and utilization equipment radio interference sources: Radio receivers for location of interference sources; antennas; procedures in location of power line source; and other means of source location.
Maintenance of radio interference control.
Field surveys.
Test method specifications and limits for overhead power lines.

AD-612 276 Div. 7, 4
CFSTI Prices: HC$2.00 MF$0.50

Pennsylvania State Univ., University Park.
Mineral Industries Experiment Station.
FUEL CELLS.
Semi-annual progress rept. for Jul-Dec 64,
by L. G. Austin, H. Lerner, and S. Almaula.
Dec 64, 50p
Contract DA49 186AMC146D
Unclassified report

Continuation of Contract DA49 186ORD917.

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Porous materials), (*Porous materials, Fuel cells), Electrochemistry, Models (Simulations), Reviews, Bibliographies, Abstracting.

The report summarizes work on the mode of operation of porous electrodes. It also includes a number of literature abstracts prepared as part of the review program.

AD-612 417 Div. 7
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command,
THE PROBLEM OF NONCONTACT OF ELECTRICAL MACHINES,
by G. I. Shturman, V. V. Apsit, and A. F. Krogeris.
1 Mar 65, 23p FTD-TT-65-124
TT 65-61826
Unclassified report

Beskontaktnye elektricheskie mashiny, I, unedited rough draft trans. Akademiya Nauk Latviiskoi SSR, Riga. Institut Energetiki. Trudy, 1961, v. 12, p. 5-22.

Descriptors: (*Electrical equipment, Machines), (*Machines, Reliability (Electronics)), Sliding contacts, Construction, Electric motors, Generators, USSR.

AD-612 420 Div. 7

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE SUBSTANTIATION OF A METHOD FOR THE CALCULATION OF A SCREENED ASYNCHRONOUS ELECTRIC MOTOR WITH CONDUCTIVE LIQUID IN GAP,
by A. V. Ivanov-Smolenskii and G. S. Tamoyan.
9 Mar 65, 17p FTD-TT-65-174
TT 65-61829
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Izvestiya, Energetika i Transport, 1964, no. 4, p. 466-473. Available only for reference use at DDC Field Services.

Descriptors: (*Electric motors, Mathematical analysis), (*Liquid metals, Electric motors), Conductivity, Magnetohydrodynamics, Model tests, Liquid metal pumps, USSR.

Substantiated is a method for the calculation of a screened asynchronous electric motor with conductive liquid in gap between rotor and stator. Mathematical formulas are given for basic parameters of the motor. Vector diagram and substitution scheme are given. (Author)

8. Electronics and Electronic Equipment

AD-611 524 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF STABILIZING THE POWER OF ULTRAHIGH FREQUENCY OSCILLATIONS,
by Yu. K. Pozhela and S. P. Kal'venas.
15 Feb 65, 5p FTD-TT-64-916
TT 65-61769

Unclassified report

Unedited rough draft trans. of Russian patent 156978 (appl no. 724160/40-23, 30 Mar 61) (pub. in Byulleten' Izobretenii i Tovarnykh Znakov (USSR) 1963, no. 17).

Descriptors: (*Radiofrequency power, Ultrahigh frequency), (*Stabilization, Radiofrequency power), Semiconductors, Waveguides, Radiofrequency generators, Germanium, Silicon, Electric currents, Amplifiers, Power meters, Circuits.

A semiconductor plate with injecting and ohmic contacts is placed in the waveguide, parallel to the electric field vector, between the UHF generator and a transient type power level detector. The UHF power is stabilized by varying the current which passes through the semiconductor plate in a straight direction. This current is controlled by a signal from the power level detector.

AD-611 526 Div. 8, 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PELLICULAR ELECTRONICS,
by F. Staros and M. Likhachev. 4 Feb 65, 12p
FTD-TT-64-921
TT 65-61771

Unclassified report

Unedited rough draft trans. of Radio, Moscow (USSR) no. 1, p. 18-20.

Descriptors: (*Electronic equipment, Films), (*Films, Electronic equipment), Manufacturing methods, Vapor plating, Vacuum apparatus, Microminiaturization (Electronics), Thin films (Storage devices), Reliability (Electronics), Electrical properties, USSR.

Pellicular electronic systems offer maximum reduction in overall dimensions, namely in complex sets, having a greater number of elements. Pellicular electronics sharply reduce the amount and volume of element connections, which in addition to economy of space, offers a considerable increase in reliability of electronic systems. Thin-filmed active elements, operating at low voltages, reduce the energy level of the operation of electronic systems. And finally, an important advantage of pellicular electronics, is connected with the possibility of manufacturing in one technological process, various elements of the system. This allows hope for a complete automation of the process of manufacturing electronic systems.

AD-611 536 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
STUDY AND INVESTIGATION OF MILLIMETER AND SUBMILLIMETER WAVE RECEIVER TECHNIQUES.
Quarterly rept. no. 5, Mar-Sep 64,
by James E. Degenford. Feb 65, 20p
Contract AF30 602 3046, Proj. 4505, Task 450501
RADC TR-64-551

Unclassified report

See also AD-425 356.

Descriptors: (*Millimeter waves, Demodulation), (*Crystal detectors, Millimeter waves), Transmission lines, Waveguide couplers, Crystals, Indium alloys, Arsenic alloys, Antimony alloys, Silicon, Magnetic fields, Video signals, Extremely high frequency, Reflectors.

This program has as its goal the development of video and superheterodyne detection techniques which are appropriate for the millimeter and submillimeter range of the spectrum. A crystal detector cartridge has been constructed in which the whisker wire is formed into a loop so that the r.f. currents in the whisker wire are set up by coupling to the magnetic field of the incident wave. The loop detector is compatible with both the reflecting beam waveguide and conventional 4 mm waveguide. Construction details and preliminary test results are presented in this report. (Author)

AD-611 550 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
UHF RANGE WAVEGUIDE ARRANGEMENT FOR EXCITATION OF H sub 30 TYPE WAVE IN RECTANGULAR WAVEGUIDE,
by V. S. Buryak. 15 Feb 65, 5p FTD-TT-64-917
TT 65-61783

Unclassified report

Unedited rough draft trans. of Russian patent 155,188, cl. 21a, 9 Apr 62.

Descriptors: (*Propagation, Waveguides), (*Waveguides, Propagation), USSR, Electromagnetic waves, Ultrahigh frequency, Rectangular bodies, Oscillation, Phase (Electronics).

The object of the invention is a waveguide arrangement of UHF range for excitation of H sub 30 type wave in a rectangular waveguide. A rectangular waveguide of large cross section is butt jointed with a rectangular waveguide of smaller cross section, excited by H sub 10 wave, and along the axis of the larger waveguide are situated two longitudinal metal plates, serving as a phase displacing device for the central channel. (Author)

AD-611 556 Div. 8, 26
CFSTI Prices: HC$3.00 MF$0.75

Tung-Sol Electric, Inc., Bloomfield, N. J.
ELECTRON TUBES RADIATION RESISTANT PILOT LINE PRODUCTION.
Quarterly progress rept. no. 5, 1 Jun-31 Aug 64,
by F. B. Parks and John Grimm. 30 Sep 64, 55p
Contract DA36 039AMC01476E

Unclassified report

See also AD-606 875.

Descriptors: (*Electron tubes, Production), Reliability (Electronics), Nuclear particles, Radiation damage, Aluminum compounds, Silicates,

Glass, Electron tube parts, Life expenctancy, Tests, Manufacturing methods, Seals (Stoppers).

Production of 6080WB, 6360 and 6205 tubes in alumino-silicate glass stems and bulbs has continued. Additionally, 5886 tubes have been prepared by means of pinch press sealing. High temperature life testing (500C bulb temperature) has continued on the 6080WB alumino-silicate tubes, eight having now successfully completed 500 hours of operation. Ten conventional glass 6360 tubes were high temperature life tested to destruction. The test then started on 6360 and 5886 tubes of alumino-silicate glass, and both are now continuing. The 1000 hours steady-state nuclear radiation exposure test has commenced on representative samples of all four tube types in both conventional and alumino-silicate glass (40 tubes, total). Bids have been solicited from interested manufacturers for a second dual exhaust system. Considerable engineering time has been devoted to the problem of obtaining better yields on the 5886 and 6205 types. (Author)

AD-611 557 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DEVELOPMENT OF X-BAND REMANENCE PHASE SHIFTERS.
Final rept. for 22 Apr 63-May 64,
by E. Stern and A. Christopher. 28 May 64, 68p
Contract AF19 628 500

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Phase shifters, X-band), Phase shift, Switching circuits, Circuits, Magnetic properties, Ferromagnetic materials, Nickel compounds, Cobalt compounds, Oxides, Hysteresis, Dielectrics, Microwave equipment, Radiofrequency power, Magnet coils.

A successful technique was devised for the design and construction of composite magnetic loop structures. Microwave circuit designs were found which provide good performance and at the same time match into composite loop structures. One square loop material was developed with properties suitable for temperature stabilization of phase shifters. The first attempt to assemble a phase shifter was not successful. (Author)

AD-611 559 Div. 8, 30
CFSTI Prices: HC$1.00 MF$0.50

Hughes Aircraft Co., Oceanside, Calif.
RESEARCH AND DEVELOPMENT OF TWO-COLOR DIRECT VIEW STORAGE TUBE WITH SELECTIVE ERASURE.
Interim development rept. for 1 Oct 64-1 Jan 65,
by P. P. Damon. Jan 65, 14p
Contract NObsr89452, Proj. SR00 80301, Task 9459

Unclassified report

See also AD-609 491.

Descriptors: (*Storage tubes, Color), (*Display systems, Storage tubes), Fluorescent screens, Brightness, Viewing screens, Electron tube parts, Electron guns, Design, Performance (Engineering), Phosphorescent materials, Europium, Yttrium compounds, Vanadates.

Design and performance data on four ten-inch, two-color storage tubes which were built during this report period are presented. The phosphor pattern in these tubes consisted of a continuous thin layer of green phosphor overlaid with red europium activated yttrium vanadate phosphor dots. The phosphor dots are registered with the storage mesh holes. Two of the four tubes were gassy and could not be evaluated. The other two were evaluated in the moving target application and performed well. Storage times which considerably exceeded the objective requirements and satisfied the more stringent needs of the moving target application were demonstrated. Color uniformity of the last tube is excellent. This tube, 502X01, has demonstrated the best overall performance of any tube to date. It has better green saturation and longer storage time than tube 435X05 which was produced during the previous quarter. Brightness has been limited because of an arc which occurred between the backing electrode and view screen. Two tubes are being fabricated similar to the last tube, except that the view screen-to-backing electrode spacing has been increased slightly.

AD-611 565 Div. 8, 26
CFSTI Prices: HC$6.00 MF$1.25

General Electric Co., Auburn, N. Y.
A PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY FOR DIFFUSED SILICON CONTROLLED SWITCHES TYPES 2N689.
Final engineering rept. for 1 Jul 63-31 Dec 64,
by J. N. Frank, A. Hishta, R. C. Rome, H. Wawrousek, and W. R. Comstock. 31 Dec 64, 209p
Contract DA36 039AMC03619E

Unclassified report

See also AD-608 240.

Descriptors: (*Electronic switches, Crystal rectifiers), (*Crystal rectifiers, Electronic switches), Silicon, Diffusion, Welding, Ultrasonic radiation, Reliability (Electronics), Surface properties, Stabilization, Crystal growth, Crystal lattice defects, Electrical properties, Packaging, Manufacturing methods, Life expectancy, Tests.

The final engineering report of a Production Engineering Measure (PEM) for the improvement of production techniques to increase the reliability of a silicon controlled switch, of the 2N689 type, under the USAECOM Contract Number DA-36-039-AMC-03619(E) of 22 June 1963, covers the work performed on improving the switch sub-assembly, the device package, the determination of consequences upon the electrical behavior of dislocation-impurity interaction in all-diffused silicon, and the results and summary of the stress tests on the improved device. Process operation instructions are included for the improvements. Program conclusions based upon the work performed are also provided, indicating, especially, the realization of the reliability objective. (Author)

AD-611 577 Div. 8
CFSTI Prices: HC$6.00 MF$1.50

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
HANDBOOK FOR RELIABILITY AND MAINTAINABILITY MONITORS,
by G. H. Allen, J. R. Barton, R. M. DeMilia, G. Grippo, and J. E. Horowitz. Dec 64, 279p
ESD-TDR-64-616

Unclassified report

Descriptors: (*Reliability (Electronics), Handbooks), (*Handbooks, Reliability (Electronics)), (*Electronic

equipment, Maintainability), Military requirements, Air Force, Management engineering.

Each section of this handbook deals with a particular problem area in (Reliability and Maintainability) matters and suggests methods of initiating and operating an R/M program. The material covered ranges from the basic elements of establishing a program thru the engineering requirements to be evaluated in design reviews. The overall operations involved in monitoring of a contractors program are defined. Several sections deal with the mathematical aspects of Reliability decision making including construction of probability of acceptance curves. (Author)

AD-611 579 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Hughes Aircraft Co., Fullerton, Calif.
VOLTAGE-ON-DEMAND CIRCUIT FOR FAST MAGNETIC DEFLECTION.
Technical administrative document,
by W. Steiger. 24 May 61, 34p Rept. no. TIC-61-33
Unclassified report

Descriptors: (*Deflection coils, Circuits), (*Circuits, Deflection coils), Transistors, Feedback amplifiers, Voltage, Damping, Deflection, Electrical conductance, Electric currents, Equations, Push-pull amplifiers, Electron tubes, Integral transforms.

An output circuit for fast push-pull operation of magnetic deflection yokes is presented. Transistors or tubes may be used to drive the yoke. The circuit permits the driver units to run at a low average power dissipation, and furnishes voltages proportional to the individual yoke currents for feedback purposes. Detailed large-signal analyses are developed for operation with and without clamping, leading to the formulation of design criteria and performance expressions. (Author)

AD-611 582 Div. 8
CFSTI Prices: HC$3.00 MF$1.50

Hughes Aircraft Co., Fullerton, Calif.
PHASED ARRAY STUDY.
Interim development rept. for 1 Oct 64-31 Jan 65,
26 Feb 65, 70p Rept. no. FR-65-14-36
Contract NOBsr89427, Proj. SR0080302, Task 9637
Unclassified report

See also AD-601 203.

Descriptors: (*Phased arrays, Phased shifters), (*Phase shifters, Diodes (Semiconductor)), Electronic switches, Switching circuits, S-band, Digital systems, Antenna radiation patterns, Phase shift, Modules (Electronic), Scanning, Radiofrequency power.

A high yield of 5.0 picofarad diodes having breakdown voltages in the 500 to 800 volt range were produced and assembled into the diode phase shifter modules. These diodes were found to be capable of operating to a peak power level of 6 kilowatts in reverse bias before high level limiting begins. 1000 volt diodes will increase the peak power level to 10 kilowatts. In forward bias the diodes were tested to 66 kilowatts, with no change in characteristic. The high average power capability of large area diodes was demonstrated by operating up to an average power level of 220 watts with no change in performance. The RMS phase errors of the phase shifters through all 16 steps were less than 4 degrees and the loss for several phase shifter modules was 2.0 db which included 1.0 db circuit loss. Using similar high cutoff frequency diodes in conjunction with a low loss package will produce an S-band diode phase shifter with less than 1.5 db loss. The measured array patterns of the 10 element antenna array with phase shift modules have clearly proved the capability of the diode phase shifters to perform beam scanning within a ±60 scan range. (Author)

AD-611 587 Div. 8, 26
CFSTI Prices: HC$5.00 MF$1.00

General Electric Co., Schenectady, N. Y.
PRODUCTION ENGINEERING MEASURE FOR VOLTAGE-TUNABLE MAGNETRONS.
Final rept. for 18 Apr 62-28 Aug 64,
by W. M. Piwnica and E. G. Soulier. 28 Aug 64, 157p
Contract DA36 039SC86722
Unclassified report

See also AD-607 804.

Descriptors: (*Magnetrons, Manufacturing methods), Voltage, Tuning devices, Production control, Specifications, Packaged circuits, Electrical properties, Environmental tests, Quality control.

The work performed on two types of voltage-tunable magnetron packages is summarized. The two types of packages are the G-E Developmental Types ZM-6103 and ZM-6104, formerly designated as the Z-5364 and ZM-6001, respectively. The product review performed on each package type is described. The necessary package modifications and the problems encountered to meet the specifications are stated. In addition, the results on the G-E Developmental Types ZM-6079 and ZM-6080 VTM tube programs are included. The problems encountered and yields obtained during the Preproduction and Production Phases of the program are divided into the following groups: parts and assembly processing; basic tube building; circuit construction and packaging; and electrical and environmental testing. Descriptions and photographs of the special equipment required on the program are given. (Author)

AD-611 588 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

General Electric Co., Schenectady, N. Y.
PROCESS SPECIFICATION FOR VOLTAGE-TUNABLE MAGNETRONS (G-E DEVELOPMENTAL TYPES ZM-6103 AND ZM-6104).
1964, 12p
Contract DA36 039SC86700
Unclassified report

See also AD-611 587.

Descriptors: (*Magnetrons, Manufacturing methods), Processing, Specifications, Tables, Voltage, Tuning devices.

Tabular listings are given for both package types (ZM-6103 and ZM-6104) and for the basic tube (ZM-6110 and ZM-6112) contained in each package. These listings include each VTM tube and package part which requires either chemical or nonchemical processing. In addition, the General Electric drawing number for the part or assembly is included as well as a chronological listing of processing, which is given by a General Electric code number. A description of each processing code number is contained in a separate section. (Author)

AD-611 591 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Bell Telephone Labs., Inc., Murray Hill, N. J.
ENGINEERING SERVICES ON TRANSISTORS.
Rept. no. 18 (Quarterly progress rept. no. 6), 1 Jul-30 Sep 64,
by C. R. Crowell, R. Edwards, R. L. Pritchett, and S. M. Sze. 30 Dec 64, 46p
Contract DA36 039AMC02227E, Proj. 1P6 22001A056
Unclassified report

See also AD-603 355.

Descriptors: (*Transistors, Germanium), (*Integrated circuits, Transistors), Microwave frequency, Encapsulation, C band, Gain, Performance (Engineering), Silicon, Electrons, Phonons, Dielectric properties, Semiconductors, Gallium compounds, Arsenides.

Planar germanium transistors with 0.2-mil-wide emitter stripes and a 0.1-mil base-contact-to-emitter separation were fabricated. Terminal f sub T values from 3 to 5 Gc, unilateral gain of 14 db at 1 Gc, and a gain figure of 32 db at 1 Gc were measured. Although this performance is comparable to that of good mesa units, an appreciably higher performance should be achievable with this structure. Base contact resistance is a primary limitation on performance of these devices. Beam-lead technology has potential application in microwave transistor assembly. Relatively large beam-lead parasitics (0.3 nh inductance, 0.1 pf capacitance-to-collector) will cause some degradation in high-frequency performance of structures under current development but can probably be tolerated in the low-microwave region. More advanced beam-lead designs, in which the total inductance of lead and package is 0.15 nh or less, offer the possibility of achieving a performance equal or superior to that obtainable with conventional bonded-wire mounting. Increasing the disparity between emitter and collector barrier heights slowly degrades the collector efficiency when electron-phonon-induced collector back-scatter in a hot-electron transistor is considered. Si is shown to be preferable to Ge and GaAs as a collector and appears capable of 85-percent collector efficiency with a collector field of 300,000 v/cm. (Author)

AD-611 622 Div. 8

National Research Council of Canada, Ottawa (Ontario).
AMPLITUDE-MODULATED END-FIRE ARRAY,
by K. Nagai. 8 Sep 64, 9p Rept. no. NRC-8212
Unclassified report

Pub. in Canadian Journal of Physics v43 p155-62 Jan 65 (Copies available only to DDC users).

Descriptors: (*Antennas, Amplitude modulation), Antenna radiation patterns, Gain, Mathematical models, Analytic geometry.

The directivity formula of a very long end-fire array made up of a continuous line of isotropic radiators is derived, assuming a sine-modulated current amplitude along the axis and constant phase difference from element to element. Sample calculations are given for an array of 40 wavelengths. The directivity of the array is found to depend on the phase velocity and the modulation coefficient; and the optimum directivity of this array is found to be greater than that of a Hansen-Woodyard array of the same length. (Author)

AD-611 627 Div. 8, 2, 24
CFSTI Prices: HC$1.00 MF$0.50

Yerkes Observatory, Williams Bay, Wis.
DEVELOPMENT OF AN ELECTRONOGRAPHIC IMAGE TUBE.
Final rept. for 1 Dec 58-31 Oct 63,
by W. A. Hiltner. 20 Nov 63, 10p
Contract AF19 604 4951, Proj. 8635, Task 863502
AFCRL 64-152
Unclassified report

Descriptors: (*Image intensifiers (Electronics), Electron optics), Photocathodes, Photographic emulsions, Foils, Aluminum compounds, Oxides, Cryogenics, Pumping (Electronics), Photographic printers, Sensitivity, Cesium electron tubes, Field emission, Gain, Resolution.

One of the tubes developed was a cesium free tube in which the photocathode was processed outside the tube and inserted when the tube was placed in operation. The other tube consisted of a 'normal' single stage tube in which great care was exercised to reduce field emission. Tubes both with and without an Al2O3 foil to separate the cathode from the plate chamber were made. The former had a very long life and extremely low background. The tube without foil and with cryogenic pumping had a shorter and variable life. The first tube without foil decreased to 85% of its original sensitivity in 5 days. Shift of the image by both the earth's magnetic field and possibly by a charging within the tube were observed. (Author)

AD-611 631 Div. 8, 25
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Electric Corp., Youngwood, Pa.
Semiconductor Div.
SOLID STATE SWITCH STUDY.
Semi-annual rept. for Apr-Sep 64,
by T. C. New, T. Nowalk, H. Ferres, T. Hamburger, and R. Smith. Jan 65, 39p
Contract AF30 602 3296, Proj. 5573, Task 557303
RADC TDR-64-450
Unclassified report

Descriptors: (*Modulators, Radar pulses), (*Semiconductor devices, Electronic switches), (*Electronic switches, Semiconductor devices), Voltage, Trigger circuits, Gates (Circuits), Rectifiers, Silicon, Plastics, Ceramic materials, Electron optics, Encapsulation, Wiring diagrams, Mechanical drawings, Photographs.

To achieve the objective of a solid state switch for handling 300 KV, new concepts in device design, encapsulation, evaluation and circuitry are being studied. Basic thyristor samples with periphery gates to enhance fast turn-on have been made. A flat disc-shaped encapsulation to minimize lead inductance and capacitance is employed; and models of both molded plastic and ceramic versions were assembled. Examples of heat radiator and stacking methods are illustrated. A thyristor test set capable of evaluating device properties for radar modulator application has been designed and constructed. Electrical-optical triggering of a series configuration of thyristors was demonstrated and design limitations calculated and discussed. (Author)

AD-611 657 Div. 8

Army Electronics Labs., Fort Monmouth, N. J.
ELECTROLUMINESCENT CELL LIGHT-OUTPUT BUILDUP FOR RECTANGULAR PULSE EXCITATION,
by Isidore H. Stein. 30 Jun 64, 2p
Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (U. S.) v52 n11 p1363-4 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electromagnetic pulses, Electroluminescence), (*Electroluminescence, Electromagnetic pulses), Phosphorescent materials, Radiofrequency pulses, Phosphorescence.

Electroluminescent cells comprised of different phosphors, cell thicknesses, and matrix materials have been subjected to variations in rectangular pulse-excitation parameters of pulse voltage, pulse width, and repetition rate for the analysis of the instantaneous response from pulse to pulse until equilibrium values were reached. The first light-output peak during the excitation pulse rise time reaches equilibrium, on the average, after the fourth or fifth successive pulse, while the second light-output peak during the fall time of the excitation pulse reaches approximately 90 per cent of equilibrium during the first pulse and is, in most cases, at equilibrium at the second excitation pulse. The variation of this double-peak response with changes in pulse excitation rise and fall times is presently being observed.

AD-611 660 Div. 8

Army Electronics Labs., Fort Monmouth, N. J.
1 Gc TRANSISTOR AMPLIFIER STAGE USING LINVILL TECHNIQUE,
by V. Gelnovatch and G. E. Hambleton. 24 Jun 64, 1p

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (Gt. Brit.) v52 n10 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Transistor amplifiers, Design), L-band, Gain, Radiofrequency power, Performance (Engineering), Graphics.

This article describes a laboratory amplifier, designed and built using the Linvill technique. From the good correlation obtained between theory and practice, the Linvill method of amplifier design at 1 Gc has been demonstrated to be an excellent tool in the hands of the design engineer.

AD-611 661 Div. 8, 25

Army Electronics Labs., Fort Monmouth, N. J.
PROPERTIES OF COOLED, UNCOATED RUBY LASER OSCILLATORS,
by F. A. Brand, H. Jacobs, C. LoCasio, G. Novick, and D. Schick. 20 Jul 64, 1p

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (Gt. Brit.) v52 n10 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Cryogenics), (*Ruby, Lasers), Pumping (Electronics), Time, Oscillators, Voltage, Oscillographs.

The delay time between pump initiation and the onset of laser action decreases with increasing capacitor voltage. Both laser power and energy output increase with increasing pump voltage, but there is a definite saturation. Random spiking is diminished as the pump voltage is increased. The duration of the laser pulse decreases with increasing pump voltage. In most instances (especially in the case of high pump voltage) the entire lasing event is over, while the pump is still delivering power at essentially its maximum rate.

AD-611 662 Div. 8, 25, 30

Army Electronics Labs., Fort Monmouth, N. J.
STATIC AND DYNAMIC PERFORMANCE OF MICROPOWER TRANSISTOR LOGIC CIRCUITS,
by J. D. Meindl, L. F. Wagner, O. Pitzalis, and R. Gilson. 19 Aug 64, 6p

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (Gt. Brit.) v52 n12 p1575-80 Dec 1964 (Copies not available to DDC or Clearinghouse customers). Revision of rept. dated 25 May 64.

Descriptors: (*Computer logic, Transistors), (*Transistors, Computer logic), Diodes (Semiconductor), Electronic equipment, Portable, Military requirements, Power, Electric currents, Films, Integrated circuits, Silicon, Thin films (Storage devices), Resistance (Electrical), Switching circuits, Gates (Circuits), Coupling circuits.

Digital transistor circuits operating in the micropower range (viz., 1 to 1000 microwatts per gate) are needed in the portable electronic equipments of a modern field army. The most basic micropower transistor requirements are, 1) junction reverse currents which are small compared with minimum operating currents, 2) useable device current gains at minimum operating currents, and 3) minimum junction capacitances in order to enhance switching speed. The micropower performance capabilities of modified direct coupled transistor logic (DCTL), diode transistor logic (DTL) and transistor transistor logic (TTL) circuits are sufficient to satisfy the present and projected requirements of many portable equipment applications. The normal operating temperature range, logic capability, and tolerance immunity of the circuits need not be compromised. Somewhat reduced stability margins may be necessary but are permissible due to lower operating power levels. Markedly reduced operating speeds are unavoidable but not at all detrimental since audio clock frequencies suffice for many portable equipments. In order to maintain adequate over-all performance, a minimum saturated transistor collector current I sub cs is required in a micropower logic gate. This minimum is most sensitive to the maximum operating temperature of the circuit. (Author)

AD-611 715 Div. 8

Colorado Univ., Boulder.
MICROWAVE MODEL TECHNIQUES TO STUDY VLF RADIO PROPAGATION IN THE EARTH-IONOSPHERE WAVEGUIDE,
by E. Bahar and J. R. Wait. 1964, 19p
Contract CST7348, ARPA Order 183 62

Unclassified report

Pub. in mono. Quasi-Optics, Brooklyn, 1964, p447-64 (Copies not available to DDC or Clearinghouse customers).
Presented at the Symposium on Quasi-Optics, Polytechnic Inst. of Brooklyn, N. Y., 8-10 Jun 64.

Descriptors: (*Ionospheric propagation, Radio waves), (*Radio waves, Ionospheric propagation), Very low frequency, Simulation, Microwave equipment, Waveguides, Optical equipment, Radiofrequency interference, Diurnal variations.

Propagation of VLF radio waves along nonuniform multimode waveguides are encountered in many actual situations. In this paper propagation across a path with an abrupt discontinuity in height is investigated. To obtain some confirmation of the theoretical investigations, a two-dimensional experimental dual model is devised. A quasi-

optical method is developed to obtain a solution for the day-to-night transition on the propagation path. The reciprocity theorem is invoked to extend the solution for the opposite direction of propagation (night-to-day path). (Author)

AD-611 718 Div. 8, 5

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
PSEUDORANDOM SCANNING,
by Thomas S. Huang. 21 May 64, 2p
Contract DA36 039AMC03200E; Grant NSF GP2495
Unclassified report

Pub. in I E E E Transactions on Communication Technology (U. S.) sic vCOM-12 n3 p105-6 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electronic scanners, Television equipment), (*Scanning, Electron optics), (*Television equipment, Electronic scanners), Signal-to-noise ratio, Sequential photography, Probability, Television communication systems, Pictures, Optical properties.

Two scanning methods, sequential and pseudorandom, were compared. Preliminary analyses indicated the following: 1) If the channel is adding to the one-dimensional picture signal some noise which is independent of the signal and which contains local structures, then pseudorandom scanning will probably give better received pictures. 2) In the case of pseudorandom scanning, the effect of a low-pass channel will be adding some independent white noise to the received picture. The noise power is quite large even if the bandwidth of the channel is reasonably wide. Hence, it seems that as far as the low-pass effect of a channel is concerned, sequential scanning will give better received pictures. (Author)

AD-611 722 Div. 8, 25

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
TRANSFORMATION OF SMALL-SIGNAL ENERGY AND MOMENTUM OF WAVES,
by R. J. Briggs. 28 Apr 64, 5p
Contract DA36 039AMC03200E, Grant NSF G24073
Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n11 p3268-72 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Perturbation theory, Waveguides), (*Transformations, Electron beams), Energy, Momentum, Relativity theory, Differential geometry, Electronmagnetism, Brillouin zones, Moment of inertia.

The transformation of the small-signal energy and momentum of a wave between two inertial reference frames as first given by Sturrock are derived by using simple perturbation theory and the appropriate transformations of length, time, current, and electromagnetic fields. The approach allows a straightforward generalization to the case of relativistic linear transformations and to nonrelativistic transformations between two reference frames that rotate with respect to each other. These rotating and linear transformations allow one to make very general statements about the frequency and wavenumbers for which negative-energy waves are obtained in a rotating and translating medium, as, for example, an electron beam in Brillouin flow. (Author)

AD-611 752 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Mitre Corp., Bedford, Mass.
LEAD ATTACHMENT AND ENCAPSULATION TECHNIQUES FOR THIN FILM MICROCIRCUITS,
by Patrick N. Everett. Feb 65, 16p
Rept. no. W-6353
Contract AF19 628 2390, Proj. 708 0
ESD TDR-64-630
Unclassified report

Descriptors: (*Packaged circuits, Manufacturing methods), (*Encapsulation, Packaged circuits), (*Microminiaturization (Electronics), Electric connectors), Electric wire, Attachment, Metal films, Bonding, Soldering, Epoxy plastics, Modules (Electronics), Resistors, Semiconductor devices, Printed circuits.

The techniques described were developed for encapsulating experimental thin film circuits deposited on 0.5-inch square glass substrates. The encapsulation is epoxy, with final package dimensions of 0.6-inch square x .125-inch thick. Up to 32 ribbon leads emerge, on .050 centers, arranged on the periphery of the package. A factor complicating the encapsulation was the requirement that the leads emerge on the four edges of the unit. A molding process using silicone rubber molds, and a hypodermic filling arrangement was evolved. (Author)

AD-611 803 Div. 8, 15

Columbia Univ., New York. Dept. of Electrical Engineering.
ON THE EQUATIONS OF NONLINEAR NETWORKS,
by Thomas E. Stern. Dec 64, 53p
Technical rept. no. TR-81
Contract Nonr425904
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Electrical networks, Nonlinear systems), (*Differential equations, Electrical networks), Functional analysis, Matrix algebra, Iterative methods, Algebra.

A systematic method of selecting state variables and formulating the normal form equations of nonlinear networks is presented. For the classes of networks considered, procedures are indicated for solving the necessary nonlinear algebraic equations by iteration. Conditions for convergence of the iterations are closely related to certain physical properties of the network. The procedures are readily adaptable to machine computation. (Author)

AD-611 804 Div. 8, 15, 30
CFSTI Prices: HC$3.00 MF$0.75

Columbia Univ., New York. School of Engineering and Applied Science.
SOME NETWORK INTERPRETATIONS OF SYSTEM PROBLEMS,
by Thomas E. Stern. Dec 64, 86p
Technical rept. no. TR-82
Contract NONR425904
Unclassified report

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Descriptors: (*Electrical networks, Mathematical programming), (*Optimization, Control systems), (*Calculus of variations, Electrical networks), Stability, Functional analysis, Partial differential equations, Numerical analysis.

Certain special properties are set forth of networks which can be exploited in synthesizing network analogs for two basic types of extremum problems. On the one hand, the fact that the equilibria of resistive reciprocal networks can be identified with stationary points of their associated dissipation functions leads in a natural way to the construction of network analogs for mathematical programming problems. On the other hand, the fact that Lagrangian networks behave in such a manner as to make a certain functional stationary leads to the formulation of networks which generate extremals for variational problems. It should be emphasized that these analogs are meant simply as network interpretations of extremum problems. The actual use to which they are put must depend upon the inclination of the individual, and on the particular problem being analyzed. Among their possible uses are, 1) as a heuristic tool to promote a better 'physical' understanding of a problem, 2) as a means of suggesting more efficient computational schemes for solving extremum problems, and 3) as a direct analog to be used either alone or in conjunction with other devices for the solution of an extremum problem. (Author)

AD-611 809 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Univac, Blue Bell, Pa.
SYNTHESIS OF LOGIC FUNCTIONS ON AN ARRAY OF INTEGRATED CIRCUITS.
Scientific rept. no. 2, Nov 63-Oct 64,
by Lester M. Spandorfer and John V. Murphy.
31 Oct 64, 83p
Contract AF19 628 2907, Proj. 4645, Task 464504
AFCRL 64 908
Unclassified report

See also AD-431 017.

Descriptors: (*Integrated circuits, Gates (Circuits)), (*Gates (Circuits), Integrated circuits), (*Microminiaturization (Electronics), Gates (Circuits)), Synthesis, Computer logic, Cascade structures, Cryogenics, Switching circuits, Sandwich construction, Theory.

This report considers the problem of synthesizing large-scale logic on an array of microcircuits. Emphasis is placed on the continued development of 'planar logic', which is a form of logic design and geometrical layout which permits fabrication of all logic interconnection lines on a single layer. The applicability of planar logic to the problem of fabricating simple neighborhood-connected arrays of cells is considered. Synthesis techniques for rectangular and triangular planar arrays of cells are described, along with special methods for symmetric functions and collapsed decoders. An extension to the theory of Sklansky tributary or cascade structures is also given. (Author)

AD-611 824 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
GRID-WIRE MOTION IN UHF PLANAR TRIODES,
by Lawrence E. Scharmann and Helmuth M. Kaunzinger. Jan 65, 11p
Technical rept. no. ECOM-2551
Proj. 1P6 22001A055, Task 1P6 22001A055 02
Unclassified report

Descriptors: (*Electron tube parts, Oscillation), (*Noise (Radio), Electron tube parts), (*Triodes, Performance (Engineering)), Ultrahigh frequency, Electron tubes, Triodes, Tetrodes, Amplifiers, Oscillators, Feedback, Voltage.

A study of close-spaced, high-gain, uhf planar triodes revealed that a self-sustained grid-wire motion phenomenon resulted in the generation of unusual audio noise under specific conditions. Analysis of the tube construction and test circuit indicated that these self-sustained grid-wire oscillations were the result of interaction between the unusually high voltage gradients between plate and grid at normal plate voltages and electrical feedback from the circuitry. Data are presented for tests showing the resultant effects of this phenomenon on a 500-Mc amplifier circuit and an amplitude-modulated, 700-Mc oscillator. Means to avoid the described difficulties or to make practical use of the effect are suggested. (Author)

AD-611 839 Div. 8

Army Electronics Command, Fort Monmouth, N. J.
INTERMODULATION INTERFERENCE: ITS RELEVANCE AND INFLUENCE IN FREQUENCY ASSIGNMENT.
Rept. for Dec 63-Jun 64,
by Nello R. Castellini. Jan 65, 68p
Technical rept. no. ECOM-TR-2546
Proj. 1E6 20501D449, Task 01
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Radiofrequency interference, Mixers (Electronic)), (*Mixers (Electronic), Radiofrequency interference), Nonlinear systems, Radiofrequency, Reduction, Compatibility, Signal-to-noise ratio, Graphics.

The theory of intermodulation is developed from a new point of view which also considers the various possible locations of the intermodulating element. The resulting approach differs radically from the conventional one and leads: (a) to the theoretical and practical intermodulation charts which afford an easy visualization of the frequencies generated in the process: (b) to the analytical analysis of the amplitude effects; (c) to the definition of the interference-to-signal ratio in terms of the parameters of the process and (d) to the definition of frequency classes useful in the generation of interference free assignments. An example of the reduction of the theoretical chart to the practical on the basis of the theory and test data is given. The general application of the theory to such reduction and to frequency assignment, however, is hampered at present by the lack of systematic and complete experimental data. The test parameters, conditions and procedures which theory indicates required to obtain meaningful experimental data are outlined. (Author)

AD-611 849 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Microwave Associates, Inc., Burlington, Mass.
BROADBAND MICROWAVE SOLID-STATE SWITCHES.
Final rept. for 24 Jun 63-31 Jan 65,
by L. Nathanson. 31 Jan 65, 90p
Contract NObsr89463, Proj. SR0080302, Task 9604

Unclassified report

See also AD-606 695.

Descriptors: (*Microwave equipment, Electronic switches), (*Diodes (Semiconductor), Electronic switches), (*Electronic switches, Broadband), L-band, S-band, C-band, X-band, Radiofrequency power, Low-pass filters, Transformers, Voltage, Electric discharges, Coaxial cables, Performance (Engineering).

Theoretical aspects pertaining to diode characteristics and behavior, and diode switch design including low pass filter design, quarter-wave transformer theory, and biasing methods are presented. The high power considerations discussed refer to both diode voltage breakdown and diode temperature response. Also included are the final design information and final experimental results of the L/S-band (1-4,5 Gc/s), C-band (4-7.5 Gc/s), and X-band (7-11 Gc/s) switches. (Author)

AD-611 908 Div. 8

Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.
WAVE HOP THEORY OF LONG DISTANCE PROPAGATION OF LOW-FREQUENCY RADIO WAVES,
by Leslie A. Berry. 15 Jul 64, 10p
Projs. ARPA 85411, NBS 85111

Unclassified report

Pub. in Radio Science (U. S.) v68D n12 p1275-84 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radio waves, Propagation), Low frequency, Very low frequency, Electromagnetic wave reflections, Ionosphere.

The idea that long radio waves propagating between the earth and ionosphere via discrete hops can be extended far into the shadow region by evaluating a series of complex integrals is exploited in this paper. Illustrative calculations of LF and VLF hops and total fields are shown as a function of distance. The second and higher hops show a pseudo-Brewster angle just before the caustic and attenuate like groundwaves in the shadow region. The form of the series of integrals for an anisotropic ionosphere is given, and a model anisotropic ionosphere varying with height is used in a sample calculation. Only a small error is caused by writing each hop as the product of an effective ionospheric reflection coefficient and an integral which is a function only of the other characteristics of the path. (Author)

AD-611 926 Div. 8, 30

Electronics Research Lab., Univ. of California, Berkeley.
A REMARK ON UNIFORM DISTRIBUTION,
by Michael A. Harrison. 18 May 64, 1p
Grant AF AFOSR639 64
AFOSR 65-0334

Unclassified report

Pub. in IEEE Transactions on Electronic Computers (U. S.) vEC13 n5 p1 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrical networks, Relays), (*Number theory, Distribution), Prime numbers.

AD-611 936 Div. 8, 5

New York Univ., N. Y. Coll. of Engineering.
CUMULATIVE CODES AS VARIABLE REDUNDANCY CODES,
by Jack Keil Wolf. 1964, 7p
Contract AF19 604 6168; Grant CAFAFOSR499 64
AFOSR 65-0333

Unclassified report

Pub. in IEEE International Convention Record (U. S.) v12 pt5 p66-72 1964 (Copies not available to DDC or Clearinghouse customers).
See also AD-417 230.

Descriptors: (*Coding, Digital systems), (*Errors, Decision theory), (*Decision theory, Feedback), Communication theory, Pulse communication systems, Corrections, Decoding, Matrix algebra, Polynomials, Probability.

A cumulative decision feedback system is considered whereby the digits are decoded on the basis of all the digits in all of the repeated blocks. If an (n,k,) binary group code is repeated (N-1) times, the resultant digits are considered as nN-tuples derived from an (nN,k) code. The parity check matrix, minimum distance and generator polynomial (for cyclic codes) are determined for the (nN,k) code. A method for partitioning the error detection and correction capabilities of the (Nn,k) code is suggested on the basis of a constant fail-safe probability criterion. (Author)

AD-611 947 Div. 8, 15

Massachusetts Inst. of Tech., Cambridge.
MEASUREMENT OF CORRELATION FUNCTIONS,
by M. Schetzen. 9 Jul 64, 5p
Contract DA36 039AMC03200E; Grant NSF G16526

Unclassified report

Pub. in Institution of Electrical Engineers. Proceedings (Gt. Brit.) v111 n12 p2100-04 Dec 1964 (Copies available only to DDC users).
Revision of paper dated 17 Mar 64.

Descriptors: (*Statistical functions, Correlators), (*Correlators, Statistical functions), Series, Fourier analysis.

A practical and relatively simple method of measuring correlation functions is presented. The method, which is applicable to all orders of correlation functions, is based upon orthogonal expansions. The application of this method to the experimental determination of a second-order crosscorrelation is discussed in detail and some experimental results are presented. (Author)

AD-611 973 Div. 8, 12

Army Electronics Labs., Fort Monmouth, N. J.
AN ANALOGUE POLARIZATION FOLLOWER FOR MEASURING THE FARADAY ROTATION OF SATELLITE SIGNALS,
by Gottfried Vogt. 30 Mar 64, 10p

Unclassified report

Pub. in Radio and Electronic Engineer (Gt. Brit.) v28 n4 p269-78 Oct 1964 (Copies not available to DDC or Clearinghouse customers).
Symposium on Signal Processing in Radar and Sonar Systems: Paper no. 13

Descriptors: (*Magneto-optic effect, Measuring devices (Electrical and Electronic)), (*Measuring devices (Electrical and Electronic), Radio scanning), (*Radio waves, Ionospheric propagation), Satellites (Artificial), Very high frequency, Radio transmission, Polarization, Angle of arrival, Measurement, Electronic scanners, Dipole antennas, Servomechanisms.

Conventional methods for measuring polarization angles, as they are employed in measuring the Faraday rotation of satellite signals, determine the time elapsed between two zeros of the polarization fading. The instrumentation described in this paper, however, makes continuous measurement and recording possible by application of a fast electronic scanning and orientation method to the steerable polarization pattern of a crossed-dipole antenna. The information obtained by the intersection of the incident polarization and the pattern scan controls a servo system that in turn steers the system pattern in order to follow the incident polarization angle. System function, theory of operation, and test recordings that are obtained from v.h.f. satellite signals are presented and discussed. (Author)

AD-612 028 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Forsvarets Forskningsinstitutt, Kjeller (Norway).
EXPERIMENTAL INVESTIGATIONS OF PUMPLESS TRANSVERSE-WAVE AMPLIFIERS,
by Agne Nordbotten and William Thon.
20 Nov 64, 22p Rept. nos. E-45, SR-1
Contract AF61 052 683
RADC TR-65-70
Unclassified report

Descriptors: (*Microwave amplifiers, Gain), Electron beams, Electron guns, Electron optics, Direct current, Magnetic fields, Excitation, Radiofrequency pulses, Electron tubes.

The unexpected gain of the drift-tube amplifier has been reproduced in new experiments. Three tubes demonstrated the correlation between net gain and sidewise gun displacement. No correlation existed between net gain and drift-tube diameter, which is contrary to the beam image pumping hypothesis. The net gain was in excess of 20 db, but the efficiency was poor. A tentative explanation of the gain mechanism is based upon the proposition that transverse waves were excited in the injection process, and that their rotational power was transferred to the beam wave excited by the RF signal. (Author)

AD-612 036 Div. 8, 15
CFSTI Prices: HC$4.00 MF$1.00

Rensselaer Polytechnic Inst., Troy, N. Y.
DESIGN AND STABILITY OF PHASE LOCKED LOOPS.
Final rept. for 1 Nov 63-31 Oct 64,
by Paul M. DeRusso, Lawrence H. Michaels, and William G. Tuel, Jr. 1 Dec 64, 118p Rept. no. 435-27
Contract AF19 628 3859, Proj. 5628, Task 562801
AFCRL 65-21
Unclassified report

Descriptors: (*Phase-locked systems, Stability), (*Circuits, Phase-locked systems), (*Nonlinear differential equations, Phase-locked systems), Filters (Electromagnetic wave), Noise generators, Optimization, Design, Networks, Linear systems, Noise (Radio), Oscillators, Radio signals.

It is shown that phase-locked loops with noise corrupted inputs can be represented by non-linear differential equations with randomly varying coefficients. Conditions for the stability of the linearized form of these equations are determined. The method used in the stability analysis is that of bounding the nth order system impulse response with that of a first order system, and determining where the first order system is stable. This is the method developed by Bershad. The results of this analysis are then applied to second and third order systems to determine their stability regions. These stability regions are experimentally verified. Parameter optimization, utilizing the stability criterion as a constraint, is then performed upon the second and third order systems to minimize their steady-state error to a noise-free ramp phase input. The results of this procedure yield the optimum filters for second and third order phase-locked loops. A comparison is then made to determine which of the two loops has a smaller steady state error to a ramp phase input. Experimental results are given for a phase-locked loop with an optimum filter designed by the above procedure. (Author)

AD-612 039 Div. 8, 5, 25, 30
CFSTI Prices: HC$3.00 MF$0.75

University of Southern California, Los Angeles. Electronic Sciences Lab.
JOINT SERVICES ELECTRONICS PROGRAM.
Final rept. for 1 Sep 63-1 Sep 64.
1 Sep 1964, 69p
Grant AF AFOSR496 64
AFOSR 65-0390
Unclassified report

Descriptors: (*Electronics, Scientific research), (*Physics, Scientific research), Reports, Materials, Semiconductors, Infrared spectroscopy, Arsenic alloys, Indium alloys, Cadmium alloys, Tellurium alloys, Tunneling (Electronics), Phonons, Crystal growth, Ferromagnetism, Ferromagnetic materials, Paramagnetic resonance, Superconductivity, Films, Plasma medium, Waveguides, Electromagnetic wave, Crystal lattice objects, Solid state physics, Plasma physics, Electromagnetism, Communication theory, Control systems, Biophysics.

Contents: Solid State: Semiconductors- Infrared properties of InAs and CdTe; Theory of phonon assisted tunneling, in semiconductors, Magnetism- Ferromagnetic resonance, Crystal growth, Magnetometer, N. M. R. in magnetic materials, Theory of conductivity of magnetic compounds, with mixed valency, Imperfections in Crystals- Deviations from stoichiometry and the phase diagram of AgBr, Imperfection chemistry of A12O3; phase diagram of the system A1-O, Imperfection chemistry of CdS, Superconductivity- Superconducting thin films as microwave circuit elements, High field superconductivity, Applied Electromagnetics and Plasma: Plasmas-Wave propagation in hot-plasma waveguides, Steady-state, hot plasma facility for guided wave propagation studies, Low frequency oscillations in a magnetically confined, current-carrying cesium plasma, Thermalization of energetic electrons injected into a highly ionized plasma, Propagation of electromagnetic waves, Transverse magnetic wave propagation in sinusoidally stratified dielectric media, On inhomogenously filled waveguides, Information Sciences: Summary, Control systems, Continuous parameter identification studies, Bioelectronics, Mathematical models of cardiovascular dynamics Coding theory-Coding for english as a second order for markov source, Polyphase coding for gaussian channels.

AD-612 050 Div. 8
CFSTI Prices: HC$4.00 MF$1.00

Thermo Electron Engineering Corp., Waltham, Mass.

THERMIONIC CONVERTER LIFE AND REPEATABILITY INVESTIGATION.
Final rept. for 2 Jan-31 Dec 64,
by C. Z. Kamien, J. H. Weinstein and F. Rufeh.
31 Jan 65, 138p Rept. no. TE-41-65
Contract AF33 615 1348, Proj. 8173, Task 817305 30
APL TR-65-7

Unclassified report

See also AD-602 285.

Descriptors: (*Thermionic converters, Life expectancy), Vacuum apparatus, Tests, Test equipment (Electronics), Cesium, Temperature, Voltage, Cooling, Electrodes, Electron guns, Powers supplies, Diodes, Degasification, Copper, Rhenium, Molybdenum, Gas analysis, Design.

Life-test equipment was designed and built to make possible testing of converters for long life as well as for cycling evaluation. Diagnostic facilities were incorporated in the design of the life-test station. The diagnostic facilities include equipment for the evaluation of gas evolution in the converters during life testing. A new technique was developed to analyze the minute quantities of gas which may evolve in the course of diode operation. Results from the outgassing of one converter are presented. The results indicate that copper members of the converter require about three times the outgassing period of any other materials. The predominant gas was found to be hydrogen for copper and hydrogen and carbon monoxide in equal amounts for the emitter and collector. Design details and life-limiting characteristics of the converter are described. These converters employ rhenium emitters operating at a design temperature of 2000K and a molybdenum collector at 940K. The converter components can be removed and replaced. Initial tests on the series 400 converters yielded an output of 30 watts at 0.7 volt (15 watts/sq cm) and 41.25 watts at 0.5 volt (20.6 watts/sq cm).

AD-612 054 Div. 8, 26
CFSTI Prices: HC$3.00 MF$0.75

Army Electronics Command, Fort Monmouth, N. J.
QUALITY ASSURANCE PAMPHLET: STANDARDS OF WORKMANSHIP FOR WIRED EQUIPMENT.
Feb 64, 78p Rept. no. AMSEL-P-715-600

Unclassified report

Descriptors: (*Quality control, Electronic equipment), (*Electronic equipment, Standards), (*Military requirements, Electronic equipment), Soldering, Soldered joints, Electric connectors, Electric wire, Electric insulation, Fastenings, Locking fastener devices, Welding, Cleaning, Electric switches, Electric terminals, Electric cables, Printed circuits, Materials, Fungusproofing, Instruction manuals, Army equipment.

The pamphlet was prepared as a guide to the standards of workmanship desired by the U. S. Army Electronics Command in wired equipment procured for the Military arms. It is intended that these standards be used primarily in the inspection and acceptance of material under U. S. Army Electronics Command Contracts. They will increase uniformity in judging defects by narrowing the individual variability of QAReps in classifying material submitted for inspection as defective or acceptable.

AD-612 058 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Scientific-Atlanta, Inc., Atlanta, Ga.
PRECISION ANTENNA PATTERN RECORDING TECHNIQUES. PHASE II.
Quarterly rept. no. 2,
by Jack B. Chastain, J. Searcy Hollis, Samuel F. Hutchins, and Rezin E. Pidgeon, Jr. Feb 65, 24p
Contract AF30 602 3425, Proj. 4506, Task 450604
RADC TR-64-541

Unclassified report

See also AD-608 475.

Descriptors: (*Antenna radiation patterns, Measurement), (*Electronic recording systems, Antenna radiation patterns), Frequency stabilizers, Display systems, Digital-to-analog converters, Measuring devices (Electrical and elecronic).

The majority of the effort was spent in specifying and purchasing components and in conducting preliminary tests with breadboard circuitry.

AD-612 059 Div. 8
CFSTI Prices: HC$2.00 MF$0.50

Raytheon Co., Waltham, Mass. Research Div.
HIGH FREQUENCY TUNNEL DEVICE STUDY.
Quarterly rept. no. 4,
by S. R. Steele and A. Starr. Feb 65, 28p
Contract AF30 602 3249, Proj. 5573, Task 557301
RADC TR-64-586

Unclassified report

See also AD-610 781.

Descriptors: (*Microwave amplifiers, Tunneling (Electronics), (*Tunneling (Electronics), Microwave amplifiers), Feasibility studies, Life expectancy, Aluminum, Gold, Aluminum compounds, Oxides, Noise (Radio), Voltage, Cathodes (Electron tubes), High frequency, Field emission, Metal films, Electric currents, Manufacturing methods.

The most immediate problem limiting the practical application of tunnel devices for low noise receiver applications has been the short lifetimes heretofore obtained. Low temperature operation is desirable to achieve low noise, and from our recent results it also seems to be highly beneficial from the standpoint of life. The lifetimes of Al:Al2O3:Au tunneling structures are extended by factors ranging from 10 to 100 when operation is carried out at 200K as compared with operation at room temperature. The large increase in sandwich current and emission into vacuum in the early stages of life of devices tested at constant voltage appears to be due to change in the barrier probably because of ion migration. The capacitance increases at a similar rate. Both effects are slowed by operation at reduced temperatures. The large increase in sandwich current observed near the end of life may be due to a runaway condition related to an apparent negative resistance which develops at voltages somewhat below the normal operating point. The change in the slope of the V-J characteristics near the end of life may be due to the development of conducting channels extending partially through the insulating film. Both of these effects are marked at low temperatures. (Author)

AD-612 060 Div. 8
CFSTI Prices: HC$4.00 MF$1.00

Naval Ammunition Depot, Crane, Ind.
MICRO-NOTES. INFORMATION ON MICROELECTRONICS FOR NAVY AVIONICS EQUIPMENT.

1 Feb 65, 126p Micro-Notes no. MN-10, QE/C-65-107
Tasks RAV03D001 3231R008 03 01, RAV03J002 2021R008 03 01 Unclassified report

Research made in cooperation with Naval Air Development Center, Johnsville, Pa., Aeronautical Electronic and Electrical Lab.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Miniature electronic equipment, Periodicals), (*Electronic equipment, Airborne), Naval equipment, Amplifiers, Gates (Circuits), Transmitter-receivers, High frequency, Single sideband communication systems, Digital systems, Analog systems.

Contents:
Evaluation
Micronote 1031. Evaluation of Texas Instruments series 52 operational and general purpose amplifiers
Micronote 1032. Evaluation of Raytheon functional devices
Application
Micronote 1041. Reliability analysis for the AN/ARC-104 (XZ-2) and (XZ-3) high-frequency single sideband transceiver
Availability
Micronote 1051. Compilation of digital microelectronic devices evaluated to date
Micronote 1052. Compilation of analog microelectronic devices evaluated to date.

AD-612 063 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
'SOLDER BALL' FORMATION IN SILICON ALLOY TRANSISTORS.
Technical rept.,
by Edward B. Hakim, Luke K. McSherry, and Bernard Reich. Jan 65, 21p Technical rept. no. ECOM-2555
Proj. 1P6 22001A056
Task 1P6 22001A056 01 Unclassified report

Descriptors: (*Transistors, Reliability (Electronics)), (*Reliability (Electronics), Semiconductor devices), Electric discharges, Silicon alloys, Performance (Engineering), Tin alloys, Electrodes, Soldering alloys, Semiconductor devices, Degradation, Temperature, Transients, Spheres.

This report discusses the investigation and solution of the so-called 'solder ball' problem which has plagued the transistor industry for years. Upon investigating silicon alloy transistors which use tin for eletrodes, it was discovered that 'solder balls' (which can cause internal short-circuiting of the device) are not necessarily associated with manufacturing procedures as previously believed, but are produced by the devices themselves because of the material used in construction. Electrical stresses or high temperatures produce balls in units which initially were free of any foreign matter. This is due to the low melting temperature tin alloy used in the transistor's (or other semiconductors) construction. Thus, devices may have balls when put in use and later cause equipment failure. The devices appear good under all measurements. However, when the device is in use, a mechanical shock may shake a ball loose, shorting the transistor and making the circuit inoperable. (Author)

AD-612 069 Div. 8, 5
CFSTI Prices: HC$3.00 MF$0.75

Westinghouse Electric Corp., Elmira, N. Y.
EXPLORATORY DEVELOPMENT OF HIGH RESOLUTION TELEVISION CAMERA TUBES.
Interim engineering rept. no. 2, 11 Sep 64-10 Jan 65,
by M. Green and R. R. Beyer. 10 Jan 65, 63p
Contract AF33 615 1271
Unclassified report

See also AD-608 113.

Descriptors: (*Television equipment, Camera tubes), (*Camera tubes, Electron optics), (*Electron optics, Camera tubes), Pictures, Optical scanning, Resolution Electron microscopes, Secondary emission, Test equipment (Electronics).

The objective of this program is to develop high performance television camera tubes by exploiting the capabilities of the secondary electron conduction (SEC) storage target. The program is divided into two principle areas. First, it is intended to establish current performance limitations of the SEC target by measuring such parameters as resolution, gain and capacity. Particular emphasis will be placed on the resolution measurements. Second, attempts will be made to find out how the target, or its mode of operation, may be modified so as to improve overall camera tube performance. Again, special attention will be devoted to achieving better resolution. The two lines of investigation are complementary, and the test equipment and procedures developed for the first part of the program will be used to evaluate any promising target modification devised during the second part.

AD-612 073 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

International Resistance Co., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURES FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
Quarterly progress rept. no. 8, 1 Oct-31 Dec 64,
by Richard C. Wagner. 31 Dec 64, 14p
Contract DA36 039AMC01461E
Unclassified report

See also AD-609 602.

Descriptors: (*Fixed resistors, Metal films), (*Resistors, Manufacturing methods), Automation, Industrial production, Quality control, Reliability (Electronics), Seals (Stoppers), Resistance (Electrical).

Design of the Automatic Binner was completed and is being built. Design of the Automatic Spiraller was completed. Design of the Sequential Sealer is in the final stages.

AD-612 077 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Warnecke Electron Tubes, Inc., Des Plaines, Ill.
RESEARCH AND DEVELOPMENT PROGRAM FOR X-BAND CROSSED-FIELD AMPLIFIER.
Quarterly engineering rept. for 12 Sep-12 Dec 64.
12 Dec 64, 55p
Contract NObsr89504, Proj. SF0100201, Task 9294
Unclassified report

See also AD-608 849.

Descriptors: (*X band, Amplifiers), (*Crossed field devices, Amplifiers), (*Amplifiers, X band), Radiofrequency, Electromagnetic fields, Attenuation, Beryllium compounds, Aluminum compounds, Oxides, Ceramic materials, Delay lines, Waveguides, Delay circuits, Electron tubes, Electron tubes parts, Electronguns, Design, Sapphire, Trans-

missions, Theory, Mathematical analysis, Electric fields, Magnetic fields, Brazing, Cooling, Water.

The theoretical portion of this report reviews the equations for steady electron flow of an ideal laminar beam under conditions of crossed electric and magnetic fields, taking account space charge in the beam and also the presence of a sole which is negative with respect to the cathode. Cold tests have been made on a full-scale line deposited on sapphire, and also on an S-band line deposited on bakelite. Measurements of propagation, attenuation, and matching are being made in S-band considering both symmetrical and anti-symmetrical modes. Beam test measurements of the optics have been made at full scale to check the performance of the emitter and of the gun, and to compare these results with calculations. Further, the transmission of the beam has been measured and the power which reaches the collector has been measured by means of a water calorimeter. The technological part of the work has been concerned with the brazing of the sapphire support of the delay line onto a block for water cooling without supports liable to cause breakage or to deformation of the sapphire. It appears that alumina allows brazing in spite of negative results of tests.

AD-612 088 Div. 8, 26
CFSTI Prices: HC$4.00 MF$1.00

Keystone Controls Corp., Newark, N. J.
PRODUCTION ENGINEERING MEASURE. CRYSTAL UNIT, TYPE CR-(XM-30)/U.
Final rept. for Jun 60-Nov 64,
by James M. Ronan. Nov 64, 131p
Contract DA36 039SC85940

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Quartz resonators, Crystal holders), (*Crystal holders, Manufacturing methods), Crystals, Glass, Seals (Stoppers), Quartz, Quality control, Processing, Aging (Materials), Specifications, Production, Heat treatment, Very high frequency, Packaging, Test equipment, Test methods.

The report includes a review of the technical problems encountered and an analysis of test results achieved in the Pilot Run. It consists of three parts: History of the PEM Study, Process Manual, and Quality Control Manual. Part I contains detailed descriptions and supporting data on problems encountered in the development of a suitable source of glass holders and sealing equipment, related crystal processing, test results achieved in the Pilot Run, yield figures, and an analysis of the aging study. Part II is the Process Manual. Material, equipment, operational descriptions are included on all processes employed in the Pilot Run. Part III consists of the Quality Control and Inspection Manual which outlines the quality control and inspection techniques applied to the Pilot Run.

AD-612 097 Div. 8
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
THE CALCULATION OF FREQUENCY-MODULATION DISTORTION IN LINEAR NETWORKS.
Final rept.,
by Oliver D. Sledge. 6 Jan 65, 19p
Rept. no. NRL-6183
Proj. RF008 04 41 4502

Unclassified report

Descriptors: (*Frequency modulation, Distortion), (*Electrical networks, Distortion), (*Band-pass filters, Electrical networks), Mathematical analysis, Linear systems.

A numerical method for calculating the steady-state FM distortion in a linear passive network using a sideband-type of analysis is developed to achieve economy of digital computer time and, for a given network, to find the number of significant sideband pairs associated with a given maximum allowable level of FM distortion. To illustrate the application of the method, the FM distortion introduced by a bandpass filter is calculated over a range of signal parameters. A useful byproduct of the FM distortion calculations is a formula for the minimum ratio of the bandwidth of the filter to twice the frequency deviation of the input signal necessary to assure that the FM distortion introduced by a bandpass filter is less than 5 percent. (Author)

AD-612 103 Div. 8, 26
CFSTI Prices: HC$1.00 MF$0.50

Piezo Crystal Co., Carlisle, Pa.
PEM QUARTZ CRYSTAL UNITS, FILTER LOW FREQUENCY, 1 MC TO 10 MC TYPES CR-(XM-49)/U THRU CR-(XM-52)/U.
Quarterly progress rept. no. 2, Oct-Dec 64,
by A. S. Matistic. 15 Feb 65, 20p
Contract DA36 039AMC03635E

Unclassified report

See also AD-609 463.

Descriptors: (*Crystal fitters, Manufacturing methods), (*Quartz, Crystal fitters), High frequency, Medium frequency, Crystal holders, Reliability (Electronics), Specifications.

Planoconvex plates, with diameter over thickness (D/T) ratios below 20, exhibit freedom from unwanted responses in the frequency region of nominal frequency ±5%. For planoconvex plates, excessively large gamma sub o values can be avoided by judicious selection of the plating spot diameter: At any specific frequency, the optimum spot - for every contour radius which produces the minimum gamma sub o value - has to be determined by experimentation. At D/T ratios below 20, conventional crystal mounts introduce severe damping at frequencies 6 mc and above; as a result, series resistance values will exceed specified maximums if adequate mounting methods are not employed. The mounting problem has not been fully solved; more work remains. (Author)

AD-612 110 Div. 8, 25
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
X-BAND SEMICONDUCTOR SWITCHING AND LIMITING USING WAVEGUIDE SERIES TEES,
by Vincent J. Higgins. 1964, 18p

Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Limiters, Diodes (Semiconductor)), (*Electronic switches, Diodes (Semiconductor)), Waveguides, X band, Varactor diodes, Silver, Germanium, Silicon.

The purpose was to describe a technique for achieving

series mode switching and limiting at X-band, using semiconductor diodes in a waveguide structure. Switching was achieved by the application of forward and reverse bias potentials to the diode terminals. When operated as a switch, the three-element configuration provided high isolation and low insertion loss, using either silver-bonded germanium varactors or silicon junction varactors. The better switching performance, i.e., higher isolation and lower insertion loss over wider bandwidths was obtained using the silver-bonded germanium diodes. The three-element series configuration has also functioned passively as a microwave power limiter. Good limiting action was attained only when silver-bonded germanium units were used. One of the principal disadvantages of this series mode of operation is power absorption. Most of the incident microwave power is absorbed within the diodes. This investigation determined the feasibility of further engineering effort and together with techniques incorporated in the diode series limiter made possible the successful development of semiconductor receiver protectors and duplexers, thereby increasing the capability and reliability of military radars.

AD-612 111 Div. 8, 30
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
MONOCYCLE POSITION MODULATION,
by William A. Huber. 1964, 15p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y. 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Correlators, Data transmission systems), (*Data transmission system, Effectiveness), Digital systems, Modulation, Bandwidth, Coding, Decoding.

The basic Monocycle Position Modulation (MPM) concepts are described and how they are applied to encode a binary digital signal stream at the transmitter, and decode the resulting MPM signal stream at the receiver. Because the MPM system is synchronous and depends on phase identification for decoding at the receiver, a special synchronizing system was developed. This system possesses unique characteristics in that it has both short time response under dynamic conditions and infinitely long time memory under static conditions. The design and operation of this synchronizing system is discussed. An experimental model of the MPM system operating directly from a binary digital signal stream at 3000 bits/second was built and the results of operational tests performed in the laboratory on this system are given.

AD-612 113 Div. 8, 25
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
SUPERCONDUCTORS IN ADVANCED ELECTRONICS,
by Gerhart K. Gaule, James T. Breslin, Raymond L. Ross, and Roy S. Logan. 1964, 13p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Superconductors, Electronic equipment), (*Electronic equipment, Superconductors), Electronic switches, Solenoids, Circuits, Superconductivity, Dielectrics, Cooling, Cryogenics, Electronic relays.

The low power as well as the high power applications of superconductivity are increasing. Both are expected to benefit from the high current relay switch developed by the authors. In contrast to previous 'switching' devices, the new switch has a true 'open' position, and is thus loss free in either position. A novel method for the storage of electrical energy is given by connecting the new switch with a high current, high inductance superconducting solenoid. The basic circuits are derived from analogous capacitor circuits. The inductive energy storage is superior to the capacitive one in the operation of pulsed light sources, for example. A sharp distinction should be made between the cooling methods suitable for the laboratory and those for technical applications. For the latter, greater use should be made of the now available closed cycle refrigerators. Higher operating temperatures for superconducting circuits are sought through improved materials. The development of special low loss dielectric materials for these circuits is also suggested. (Author)

AD-612 114 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
HIGH POWER MICROWAVE DEVICE APPLICATIONS FOR NEW NARROW RESONANCE LINEWIDTH PLANAR HEXAGONAL FERRITES,
by Samuel Dixon, Jr., Robert O. Savage, Jr. and Arthur Tauber. 1964, 15p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Microwave equipment, Ferromagnetic materials), (*Ferromagnetic materials, Microwave equipment), Magnetic resonance, Manganese compounds, Barium compounds, Zinc compounds, Ferrites, Yttrium compounds, Single crystals, Limiters, X band, K band, Radiofrequency power.

A ferromagnetic resonance linewidth of 3.8 oersteds at 9.0 kMc and room temperature represents a considerable improvement in material technology for hexagonal ferrites with planar anisotropy. The linewidth compares favorably with that found in single-crystal YIG and in lithium ferrite. This investigation has shown that the large planar anisotropy endows ZnY materials with several distinct advantages in enhancing the design of microwave devices. The anisotropy field increases the frequency range for the coincidence of the first- and second-order processes, which inherently gives a lower threshold power level. In addition, the anisotropy field tends to decrease the critical field (power level) at which spin-wave instabilities set in. From the measured threshold field, a spin-wave linewidth of 0.74 oersteds has been calculated for manganese-substituted ZnY. A variety of investigations on the feasibility of microwave devices using manganese-substituted ZnY are currently in the design stage. Among them are an orthogonal resonant strip-line gyromagnetic limiter at X-band frequencies, a parallel pumped shunt arm cavity limiter at K sub-band frequencies, and a TE101 cavity subsidiary resonance limiter. (Author)

AD-612 115 Div. 8
CFSTI Prices: HC$3.00 MF$0.75

Hughes Aircraft Co., Los Angeles, Calif.
APPLIED RESEARCH ON EFFICIENCY IMPROVEMENT IN O-TYPE TRAVELING-WAVE TUBES.
Interim engineering rept. no. 2, 15 Oct 64-15 Jan 65.
by O. Sauseng. Jan 65, 58p
Contract AF33 615 1951, Task 415603
Unclassified report

See also AD-608 930.

Descriptors: (*Traveling-wave tubes, Synchronization (Electronics)), (*Electron beams, Traveling-wave tubes), Efficiency, Test equipment (Electronics), Velocity, Performance (Engineering), Voltage.

A single velocity-step taper has been tested in the demountable apparatus. Improvements of the electronic efficiency of nearly 30% over that of the standard circuit were observed, while the depressed efficiency was about the same. A design evaluation of the taper section on the basis of a large-signal computer analysis for step tapers showed good qualitative agreement with predictions. The step-taper was estimated to be too large, while it had about the correct velocity step magnitude for the test conditions. Investigations indicate that at lower beam perveances the beam flow appears to change from a highly non-laminar to a much more laminar Brillouin flow. At low beam perveances and apparent laminar flow conditions the efficiency is significantly increased. At these conditions efficiencies up to 50% were observed. At frequencies near the lower cutoff a beam loading effect in the circuit properties was noted. The tube parameters are then considerably changed from those obtained with cold circuit measurements. An accurate spent beam velocity analyzer has been developed for detailed efficiency evaluations. The effects of the electrostatic potential distribution, the secondaries and the space charge on the accuracy of the analyzer are discussed. The beam analyzer also provides electron optical information about the beam. (Author)

AD-612 120 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
TE(01) CROSS-GUIDE TRANSDUCER AND ISOLATOR,
by John P. Agrios, C. D. Neudorfer, and R. A. Stern.
1964, 15p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I., AD-611 432.

Descriptors: (*Waveguides, Transducers), (*Waveguide couplers, Microwaves networks), Cylindrical bodies, Rectangular bodies, Transmission lines, Microwaves, Ferroelectric materials.

The paper discusses two particular circular waveguide components, (1) the TE(10) mode rectangular waveguide to TE(01) circular waveguide transducer, and (2) the TE(01) ferrite isolator. The transducers are used to transform microwave energy from TE(10) mode in the rectangular waveguide to the TE(01) mode in a circular waveguide. The ferrite isolator was developed to prevent interaction between the circular waveguide and the rectangular waveguide.

AD-612 146 Div. 8, 30
CFSTI Prices: HC$3.00 MF$0.75

Illinois Univ., Urbana. Engineering Experiment Station.
A DIGITAL TECHNIQUE FOR THE MEASUREMENT OF PHASE ANGLE,
by William G. Steiner. Jan 65, 57p
Publication no. RRL-272, Technical rept. no. TR-26
Contract Nonr183402, Proj. NR371 161
Unclassified report

Descriptors: (*Phase meters, Digital computers), (*Digital computers, Phase meters), (*Direction finding, Radio equipment), Digital systems, Pulse amplifiers, Oscillators, Computer logic, Measuring devices (Electrical and electronic), Noise (Radio), Gates (Circuits), Trigger circuits.

A digital technique for the measurement of phase angle is presented. Although the method is completely general, a particular model is designed here. The model is designed to measure in 100 microseconds the phase angle between two 250 kc input signals which range independently between 50 mv and 10 v rms in amplitude. The measurement is indicated electronically by means of sixteen parallel output signals and visually by means of four Nixie indicator lamps. This discussion also includes a statistical analysis of the effect of random noise on accuracy and an evaluation of a portion of the phasemeter which was actually built and tested. (Author)

AD-612 147 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
PRECISION MEASUREMENT OF VHF GAIN AND POINTING ACCURACY OF THE NRL 150-FOOT PARABOLIC ANTENNA.
Interim rept.,
by P. F. Nicholson. 13 Jan 65, 20p NRL-MR-1587
Proj. RF001 08 41 4553
Unclassified report

Descriptors: (*Parabolic antennas, Measurement), Gain, Temperature, Errors, Sky brightness, Effectiveness, Very high frequency, Radio astronomy, Antenna feeds, Dipole antennas, Physical properties.

Radio astronomy techniques were employed by accurately determine the gain, pointing error, and temperature of the CBA, NRL 150-foot parabolic antenna system. A frequency of 146 Mhz was chosen for measurements corresponding to one of the few 4-Mhz wide channels in the mid-VHF spectrum free from commercial transmitters. The power gain at this frequency was measured as 34.9 db corresponding to an efficiency of 63% and evidenced a high performance antenna system for its class. This result also corroborated predictions of photogrammetric studies and other calibration checks on the dish. The pointing error was found to be 0.08 degrees which was well within the tolerance specified by the beam width at this frequency. Antenna temperature measurements corresponded closely to the expected sky-brightness temperature leading to the conclusion that broadband, man-made, RFI (broadband interference) did not significantly contribute to the continuum background noise. (Author)

AD-612 149 Div. 8, 13, 14
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
BUILDING MATERIALS FOR ATTENUATING ELECTROMAGNETIC INTERFERENCE.
Technical rept. for Jun 62-Sep 64,
by H. A. Lasitter. 4 Mar 65, 39p Rept. no. TR-R-359
Proj. Y F006 09 02 208
Unclassified report

Descriptors: (*Buildings, Materials), (*Electromagnetic shielding, Buildings), (*Materials, Electromagnetic shielding), Aging (Materials), Vinyl plastics, Silicone plastics, Rubber, Textiles, Carbon, Films, Metals, Radio interference, Shale, Electrical conductance.

The electromagnetic shielding properties of coke -

cement materials have been investigated experimentally an theoretically. Calculated and measured values are in close agreement. The conductivity of six samples of coke - cement has been determined. Repeated measurements after 19, 29, 30, 32, 33, 36, and 191 days show the effect of aging on the conductivity of coke - cement materials. These materials were found to be capable of shielding electromagnetic interference of the type that would emanate from the average administrative building under certain circumstances. Eight types of material available commercially and used as construction material were evaluated as electromagnetic shields. (Author)

AD-612 150 Div. 8, 1
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Inst., of Tech., Lexington.
EL CAMPO SOLAR RADAR ANTENNA MODIFICATION.
Group rept.,
by M. E. Devane. 8 Feb 65, 23p Rept. 1965-12
Contract AF19 628 500
ESD TDR-65-44

Unclassified report

See also AD-292 173.

Descriptors: (*Radar antennas, Radio astronomy), (*Dipole antennas, Radio astronomy), Sun, Antenna components, Standing wave ratios, Coupling circuits, Coupled antennas, Impedance matching, Very high frequency, Gain, Electromagnetic wave reflections, Antenna radiation patterns, Transmission lines, Measurement, Radar reflections.

The east-west aperture of the El Campo Solar Radar Antenna was doubled. Mechanical and electrical improvements incorporated at the time of the expansion, together with the increased size, resulted in an increase in gain of approximately 3-1/4 db.

AD-612 188 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
SOME ERRORS IN CALCULATING THE CENTROID OF AN UNPERTURBED WULLENWEBER BEAM PATTERN,
by Robert McAulay. Aug 63, 22p
Publication no. RRL-207, TN-66
Contract NObsr89229

Unclassified report

Descriptors: (*Antenna radiation patterns, Determination), (*Radio beams, Determination), (*Sampling, Radio signals), Digital systems, Errors, Probability, Distribution, Mathematical analysis, Theory.

The Wullenweber beam pattern is assumed to be given by (sin z)/z. This function is sampled at a series of equi-spaced angular points and the sample values quantized in digital format. The mean of the distribution is used to locate the maximum of the function (or the direction of arrival of the received ray), and the case in which the angular sample points are non-symmetrically spaced about the direction of arrival of the ray is considered in detail. Curves showing the errors in the arrival angle, as estimated by the mean of the digitized pattern, are given as a function of the skew between the sampling pattern and the beam pattern for various numbers of sampling points and quantization levels. The probability distribution of the error for small numbers of samples is also developed. (Author)

AD-612 273 Div. 8, 14, 25
CFSTI Prices: HC$2.00 MF$0.50

Bell Telephone Labs., Inc., Whippany, N. J.
FERRIMAGNETIC MATERIALS AT MICROWAVE FREQUENCIES,
by A. S. Boxer, H. L. Goldstein, H. E. Noffke, and J. F. Ollom. Jul 64, 48p
Contract AF33 657 8439, Proj. 7371, Task 737103
ML TDR-64-224

Unclassified report

See also AD-612 274.

Descriptors: (*Ferromagnetic materials, Microwave equipment), (*Ferrites, Microwave equipment), Radio-frequency power, Ferromagnetism, Frequency modulation, Magnetic resonance, Relaxation time, Oscillation, Transition temperature, Dielectric properties, Magnetic properties, X band, K band, Garnet, Iron compounds, Yttrium compounds, Impurities, Aluminum, Ytterbium, Magnesium compounds, Manganese compounds, Aluminum compounds, Nickel compounds, Oxides.

The properties of ferrite materials suitable for microwave applications have been studied. A review was made of existing theories on large-signal behavior of ferrites. In addition, the effect of frequency modulation on high-power instability was studied. It was found that frequency modulation raises the threshold power for nonlinear breakdown; the optimum modulating frequency is related to the spin-wave line width. An experimental study was made of relaxation oscillations occurring in single-crystal yttrium iron garnet excited above the threshold of nonlinearity in a resonant cavity. The experiments showed that stable oscillations occur only at power levels close to the threshold; at higher power levels, they become erratic. From observation of frequency and amplitude under different operating conditions, it was concluded that these oscillations are intrinsic to the sample and do not depend on cavity parameters. Instrumentation was developed to measure complex permittivity at X-band and resonance line width and spin-wave line width at both X- and K sub u-bands. Measurements on selected samples showed that high spin-wave width, which is required for high-power operation, is, in general, connected with high resonance line width. In most cases, line widths at K sub u-band are higher than those at X-band. No correlation was found between dielectric and magnetic losses. (Author)

AD-612 274 Div. 8, 14, 25
CFSTI Prices: HC$8.60 MF$2.75

Bell Telephone Labs., Inc., Whippany, N. J.
PROPERTIES OF FERRIMAGNETIC MATERIALS FOR MICROWAVE APPLICATIONS,
by A. S. Boxer, J. F. Ollom, and R. F. Rauchmiller. Jul 64, 558p
Contract AF33 657 8439, Proj. 7371, Task 737103
ML TDR-64-224 attachment

Unclassified report

Attachment to AD-612 273.

Descriptors: (*Ferromagnetic materials, Microwave equipment), (*Ferrites, Microwave equipment), Ferromagnetism, Magnetic properties, Transition temperature, Dielectric properties, Magnetic resonance, Magnetic moments, Crystal lattices, Resistance (Electrical), Acoustic properties, Optical properties, Garnet, Spinels, Ferrites, Yttrium compounds, Iron compounds, Oxides, Rare earth compounds, Magnesium compounds, Manganese compounds, Nickel compounds, Lithium compounds, Barium compounds, Zinc compounds.

This handbook presents data on microwave ferrites

currently available in the literature. Materials covered include garnets, spinels, and hexagonal barium ferrites. Properties discussed include saturation magnetization, Curie temperature, g-factor, resonance line width, anisotropy, lattice constant, dielectric constant, and resistivity.

AD-612 315 Div. 8, 25

Illinois Univ., Urbana.
PHOTOMULTIPLICATION WITH MICROWAVE RESPONSE,
by O. L. Gaddy and D. F. Holshouser. 1963, 6p
Contract AF49 638 556; Grant AF AFOSR62 250
AFOSR 65-0440

Unclassified report

Pub. in mono. Quantum Electronics III, Columbia Univ. Press, v1 p1717-22 1964 ( ) (Copies available only to DDC users).

Descriptors: (*Photomultipliers, Radiofrequency power), Crossed field devices, Secondary emission, Microwave frequency, Electric fields, Electron optics, Light, Demodulators.

In this paper, some recent results of an investigation of a new kind of photomultiplier which is capable of microwave response is presented. In this method of amplification, called dynamic crossed-field electron multiplication (DCFEM), the energy for electron multiplication is obtained from a microwave electric field rather than an electrostatic field, and the multiplication takes place upon a single secondary emitting electrode. This method provides a rigid control of electron transit time through phase focusing thereby making possible a large amplification of weak photoelectron currents varying at microwave rates.

AD-612 321 Div. 8, 25

Oxford Univ. (England).
DIAMAGNETIC RESONANT ELECTRONIC EXCITATION OF MICROWAVES.
Revised ed.,
by M. J. Lazarus. 19 May 64, 11p
Grant AF EOAR63 33
AFOSR 65-0417

Unclassified report

Pub. in British Journal of Applied Physics (Gt. Brit.) v15 p1075-84 1964 (Copies available only to DDC users).
Revision of rept. dated 10 Feb 64.

Descriptors: (*Microwave amplifiers, Plasma oscillations), (*Plasma oscillations, Microwave amplifiers), Resonance, Excitation, Microwave frequency, Electron beams, Magnetic fields, Cyclotron resonance phenomena, Quantum mechanics, Perturbation theory.

A theoretical study has been made of the interaction of two opposing and interpenetrating streams of charged particles when subjected to a longitudinal magnetostatic field in a waveguide. The calculations have been made both classically and quantum mechanically and they show that, for two frequencies, stimulation is possible. These are of the order of 1/2 X cyclotron resonance frequency, and the system is therefore promising as a generator or amplifier for very high frequencies. The practical realization of this device is discussed and a solid state version using electrons and holes in a semiconductor is suggested. (Author)

AD-612 324 Div. 8, 25

Minnesota Univ., Minneapolis. Dept. of Electrical Engineering.
EXPLICIT FORMS FOR THE CONDUCTIVITY AND PERMITTIVITY OF BULK SEMICONDUCTORS IN WAVEGUIDES,
by Keith S. Champlin and Donald B. Armstrong.
27 Nov 61, 1p
Contract AF49 638 747
AFOSR 3401

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (U. S.) v50 n2 Feb 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Semiconductors, Waveguides), (*Waveguides, Semiconductors), Semiconductor devices, Microwaves, Propagation, Perturbation theory, Probes (Electromagnetic), Electrical properties.

Recent interest in the analysis of waveguides containing bulk semiconductors has been motivated by two different possible applications: (1) microwave measurement of electron transport phenomena and (2) development of bulk semiconductor microwave devices. In the first application, one desires to find the conductivity and/or permittivity (or changes in these quantities caused by carrier injection, dc electric and magnetic fields, etc.) from measurement of the transmission or reflection coefficient of a waveguide containing the semiconductor. For the second application, the inverse problem is generally of interest. The discussion in this note will be confined to the first application, the measurement problem.

AD-612 332 Div. 8

New York Univ., N. Y. Coll of Engineering.
SHANNON'S THEORY AND FEEDBACK SYSTEMS,
by S. S. L. Chang. 19 Feb 59, 8p
Contract AF49 638 586
AFOSR 3435

Unclassified report

Pub. as ASME Paper no. 59-IRD-12.
Rept. prepared for presentation to the Instruments and Regulators Conference, Cleveland, Ohio, 29 Mar-2 Apr 59.

Descriptors: (*Communication theory, Feedback), Errors, Control systems, Signal-to-noise ratio, Functions, Theory, Equations, Signals.

Feedback can be used as a means of realizing Shannon's predicted errorless capacity of a noisy communication channel. On the other hand, Shannon's information theory can be used as a guide for rating feedback control systems as well as selecting system components. A brief summary of the former aspect, and the results from some preliminary investigations of the latter aspect are presented. Included topics are calculations of required information capacities of control systems from input characteristics and fidelity requirements, required information capacities of system components, and calculation of information capacities of system components from saturation limits, threshold levels, and transfer functions. (Author)

AD-612 374 Div. 8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

CARRYING CAPACITY OF MULTITRACK SYSTEM, by I. A. Ovseevich. 25 Jan 65, 23p FTD-MT-64-394 TT 65-61816

Unclassified report

Edited machine trans. of Problemy Peredachi Informatsii (USSR) 1963, no. 14, p. 43-58.

Descriptors: (*Multipath transmission, Propagation), (*Radio signals, Attenuation), Signal-to-noise ratio, Diversity reception, Noise (Radio), Correlation techniques, USSR.

The carrying capacity is calculated of a multitrack system, in each of whose channels the mechanism of forming of output signal is like that taken for multibeam propagation of short radio waves. Also considered is the general case, when not only fading, but also noises turn out to be dependent.

9. Fluid Mechanics

AD-611 615 Div. 9, 4

Polytechnic Inst. of Brooklyn, N. Y.
EIGENVALUES FOR THE EQUATION OF SPECIES CONSERVATION WITH HETEROGENEOUS REACTION,
by Gerald S. Janowitz and Paul A. Libbey. 15 Jun 64, 2p
Grant AF AFOSR62 409
AFOSR 65-0031

Unclassified report

Pub. in A I A A Journal (U. S.) v2 n10 p1849-50 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Laminar boundary layer, Chemical reactions), (*Catalysis, Laminar boundary layer), (*Boundary value problems, Laminar boundary layer), Surface properties, Gas flow.

AD-611 759 Div. 9
CFSTI Prices: HC$4.00 MF$0.75

Institute for Aerospace Studies, Univ. of Toronto (Ontario)
AN EXPERIMENTAL INVESTIGATION INTO THE SHAPE OF THRUST-AUGMENTING SURFACES IN CONJUNCTION WITH COANDA-DEFLECTED JET SHEETS (PART I),
by C. D. Hope-Gill. Dec 64, 109p
Technical note UTIAS-TN-70
Grant DA TC44 177G1, Task 1D121401A14224
TRECOM TR64 23; AD 610543 superseded

Unclassified report

Descriptors: (*Coanda effect, Thrust), (*Aerodynamic control surfaces, Aerodynamic configurations), Jets, Thrust vector control systems, Subsonic flow, Thrust augmentor nozzles, Two-dimensional flow, Vertical take-off planes, Short take-off planes, Momentum, Lift, Stability, Optimization, Canada.

It is known that by means of additional surfaces, the thrust of a jet or jet sheet can be enhanced (thrust augmentation). This especially applies to Coanda-deflected jet sheets because of the inherent stronger entrainment into curved flow surfaces. The flow from a two-dimensional subsonic nozzle was deflected by quadrants. A composite thrust-augmenting surface was added, and the effect of its shape on thrust augmentation was studied at various nozzle pressure ratios and radii of the quadrants. This investigation yielded a maximum thrust augmentation of 1.21 for several optimum configurations, which was governed primarily by the relative magnitude and direction of the momentum of the secondary (entrained) flow in relation to the primary (nozzle) flow momentum. Thrust augmentation decreased with increasing nozzle pressure ratio but was independent of the quadrant radius. Some of the observed results were predicted theoretically. Suggestions for possibly introducing higher thrust augmentation are offered. (Author)

AD-611 790 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

Texas Technological Coll., Lubbock. School of Engineering.
SIMPLIFICATION OF FLUID-FLOW COMPUTATIONS FOR ORIFICE METERS.
Master's thesis,
by Eugene Byron Catherman. May 65, 57p
Contract AF33 608 1119

Unclassified report

Descriptors: (*Fluid flow, Mathematical analysis), (*Flourmeters, Orifices), Fluid mechanics, Transport properties, Programming (Computers), Graphics.

This report presents the derivation of the H number for use with the thin-plate orifice fluid-flow meter with vena contracta taps. The arduous task of velocity determination was circumvented by elimination of the Reynolds number in calculation of mass flow rate. Further simplification was attained by use of a digital computer program to realign extensive experimental, enabling a tabular and graphic presentation of the three dimensionless parameters. Use of these three parameters permits convenient determination of the mass flow rate through knowledge of the easily measured factors contained in the H number. Determination of the items normally associated with measurement of fluid-flow by an orifice meter (i.e., the velocity of approach, coefficient of discharge, and flow coefficient) was eliminated, resulting in a more simplified method of analysis.

AD-611 792 Div. 9, 15
CFSTI Prices: HC$3.00 MF$0.75

Texas Technological Coll., Lubbock. School of Engineering.
DIMENSIONAL ANALYSIS SIMPLIFICATION OF VENTURI METER COMPUTATION.
Master's thesis,
by John Finis Frazier. May 65, 64p
Contract AF33 608 1119

Unclassified report

Descriptors: (*Flowmeters, Mathematical analysis), (*Fluid flow, Determination), Fluid mechanics, Transport properties, Venturi tubes, Pressure gages, Programming (Computers).

Through the use of dimensional analysis dimensionless parameters were developed which simplify computation of mass flow rates of a fluid through a pipe, as measured by a Venturi meter. Numerical values for new parameters were obtained for various size Herschel type Venturi meters, and plot of representative curve led to development of an equation for direct mass flow rate determination.

AD-611 817 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Technion - Israel Inst. of Tech., Haifa.
ANALYSIS OF THE NEAR WAKE PRESSURE IN SUPERSONIC FLOW USING THE MOMENTUM INTEGRAL METHOD.
Interim scientific rept. no. 5,
by Josef Rom. Sep 64, 44p Rept. no. TAE-35
Contract AF61 052 576
ARL 65-2

Unclassified report

See also AD-434 823.

Descriptors: (*Supersonic flow, Separation), (*Base flow, Pressure), Axially symmetric flow, Laminar boundary layer, Turbulence, Two-dimensional flow, Wake, Correlation techniques, Integral equations, Momentum, Graphics, Aerospace craft, Israel.

The pressure of two-dimensional base type separated

regions is evaluated by use of semi-empirical analysis. The analysis is based on the momentum integral method. Empirical parameters required in the analysis are evaluated from various available experimental data. Good correlation over a large range of variation of the physical parameters is obtained in the cases of two-dimensional supersonic flows for both laminar and turbulent separation over backward facing steps and blunt bases. The axially symmetric base type flows seem to be affected by the inviscid axially symmetric external flow in a different manner than found in the two dimensional case. It seems that the parameters applicable for the two-dimensional base type flows are not sufficient for the correlation of the axially symmetric separated flows. (Author)

AD-612 006 Div. 9, 2
CFSTI Prices: HC$4.00 MF$0.75

National Engineering Science Co., Washington, D. C.
GENERATION OF WAVES BY WIND: STATE OF THE ART,
by Charles L. Bretschneider. 15 Jan 65, 103p
Rept. no. NESCO-SN-134-6
Contract Nonr417700
Unclassified report

Presented at International Summer Course Lunteren (Netherlands), 1-18 Sep 64.

Descriptors: (*Water waves, Wind), (*Wind, Water waves), (*Fluid mechanics, Water waves), Marine meteorology, Marine geophysics, Oceans, Seas, Reviews.

Contents:
Practical applications -- deep water
Significant wave concept
Complex nature of sea surface
Wave variability
Wave spectrum concepts
Froude scaling of the wave spectrum
Propagation of waves and swells into shallow water
Generation of wind waves in shallow water
Generation of wind waves over a bottom of constant depth
Decay of waves in deep water
Wave statistics
Wind speed versus wind speed.

AD-612 019 Div. 9, 31
CFSTI Prices: HC$3.00 MF$0.75

Vidya Div., Itek Corp., Palo Alto, Calif.
INTERFERENCE BETWEEN A HULL AND A STERN-MOUNTED DUCTED PROPELLER.
Technical rept. for 1 Oct 63-1 Oct 64,
by Anthony R. Kriebel. 30 Sep 64, 77p
Rept. no. Vidya-161
Contract Nonr427800, Projs. SR009 01 01, 9066, Task 1
Unclassified report

Descriptors: (*Hydrodynamics, Ship structural components), (*Ship structural components, Hydrodynamics), (*Underwater propulsion, Hydrodynamics), Hulls (Marine), Propellers (Marine), Theory.

The hydrodynamic interference between an underwater hull and a stern-mounted ducted propeller is predicted by theoretical analysis. The analysis assumes axially symmetric potential flow, and the hull wake vorticity is concentrated into multiple vortex cylinders extending downstream from the boattail. The interference forces are predicted versus the following geometric parameters with the hull shape held fixed to represent TMB Model 4620: duct chord-to-diameter ratio, duct size, duct axial spacing from hull, axial location of propeller within duct, duct camberline shape, and number of vortex cylinders used to represent hull wake. Also, the effect of duct profile thickness upon the analytical results is estimated and shown to be small. The computed results show that cylindrical ducts are unsuitable for propulsion of the assumed hull shape because, at cruising speed, they are ineffective in reducing the propeller thrust, they have large leading-edge suction, and they produce large hull interference. However, when duct camber is added, the results also show that if all of the other geometric parameters are specified, a duct camberline can be designed so that the duct carries more thrust than the propeller without any leading-edge suction or hull interference. (Author)

AD-612 025 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

Saint Anthony Falls Hydraulic Lab., Univ. of Minnesota, Minneapolis.
STUDIES OF THE FLOW CHARACTERISTICS OF A COMPRESSIBLE, BUBBLY MIXTURE ABOUT SUPERCAVITATING BODIES AND IN A CONVERGING-DIVERGING NOZZLE,
by F. R. Schiebe, J. M. Wetzel, and K. E. Foerster.
Apr 64, 62p Technical paper no. TP-48, series B
Contract Nonr71052, Proj. S R009 01 01
Unclassified report

Descriptors: (*Cavitation, Drag), (*Drag, Mixtures), (*Compressible flow, Cavitation), (*Convergent divergent nozzles, Supersonic flow), Subsonic flow, Conical bodies, Axially symmetric flow, Bubbles, Air, Water, Pressure, Shock waves.

Experimental studies made to determine the effect of a compressible, air-water mixture on the drag characteristics of a cavitating body. Data are reported for a series of conical bodies of various slenderness ratios for free stream Mach numbers up to 0.7. Results indicate that the drag coefficient increases with Mach number, although in general not as rapidly as for a non-cavitating body. It was possible to apply Gothert's rule to adequately predict the drag coefficient up to Mach numbers of about 0.6. A brief study was also conducted to study the flow characteristics of an air-water mixture in a converging-diverging nozzle. Supersonic flow was obtained and shock waves were observed downstream of the throat. Measured throat pressures for choked flow were somewhat higher than those calculated from homogeneous mixture theory. (Author)

AD-612 056 Div. 9, 14
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
THE EFFECT OF ADDITIVES ON FLUID FRICTION.
Summary rept.,
by J. W. Hoyt and A. G. Fabula. Dec 64, 31p
Rept. no. NOTS-TP-3670
Task RUTO3E000 216 1R009 01 03
NAVWEPS 8636
Unclassified report

Presented to the Office of Naval Research: Symposium on Naval Hydrodynamics (5th), 12 Sep 64 at Bergen, Norway.

Descriptors: (*Solutions, Fluid flow), (*Epoxy plastics, Friction), (*Lubricants, Fluid flow), (*Drag, Reduction), Lubricant additives, Polymers, Solvents, Solubility, Surface properties, Reynolds number, Molecular weight, Viscosity, Degradation, Feasibility studies, Pipes, Rotation, Disks, Effectiveness, Reviews.

A brief review is given of the literature on turbulent flow of high-polymer solutions. Laboratory experiments using rotating disks and turbulent pipe flow have led to generalizations as to characteristics of friction-reducing high polymers. Linear, high-molecular-weight, soluble polymers are shown to be most effective. The maximum drag reduction achievable by polymer addition appears to be a function of the Reynolds number of the flow. (Author)

AD-612 079 Div. 9, 15
CFSTI Prices: HC$4.00 MF$1.00

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
A UNIFORMLY VALID ASYMPTOTIC THEORY OF RARIFIED GAS FLOWS UNDER THE NEARLY FREE-MOLECULE CONDITIONS,
by Young-ping Pao. 18 Dec 64, 133p Rept. no. MF-43
Grant AF AFOSR62 266
AFOSR 65-0276

Unclassified report

Prepared in cooperation with Gas Dynamics Lab., Princeton Univ., N. J., Contract AF49 638 1271.
See also AD-290 695.

Descriptors: (*Superaerodynamics, Gas flow), (*Gas flow, Kinetic theory), Transport properties, Boundary value problems, Partial differential equations, Integrals, Iterative methods, Molecules, Velocity, Mathematical models, Cylindrical bodies, Rotation.

An asymptotic theory for obtaining nearly free-molecule solutions which are uniformly valid throughout the flow field of an infinite rarefied gas is proposed in the present study for the linearized Boltzmann equation with hard-sphere molecules. Power-law molecules can be treated in a like manner. The theory is based on a new integral formulation of the linearized Boltzmann equation. An inner-and-outer-expansion procedure is used. The simplification in the inner region is that the collisional effects are only secondary while outside of the inner region the angle subtended by the body is small so that the flow field is essentially that created by a source at the origin. In order to examine the mathematical nature of this asymptotic theory, a two-dimensional circular cylinder rotating in a rarefied gas, which is at rest at infinity, is studied. It is proved that the inner and outer solutions obtained by the theory are indeed asymptotic to the true solution throughout the physical space.

AD-612 081 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Polytechnic Inst. of Brooklyn, N. Y.
A MOMENT METHOD FOR COMPRESSIBLE LAMINAR BOUNDARY LAYERS AND SOME APPLICATIONS,
by Paul A. Libby and Herbert Fox. Sep 64, 42p
Rept. no. PIBAL-615
Grant AF AFOSR1 63, Proj. 9781 01
AFOSR 64-1786

Unclassified report

Presented by the first author in a graduate course at the Polytechnic Institute of Brooklyn in the spring of the 1961-62 academic year.

Descriptors: (*Laminar boundary layer, Compressible flow), Transonic flow, Transport properties, Heat transfer, Friction, Enthalpy, Aerodynamic heating, Mathematical analysis, Integral equations, Partial differential equations, Moments, Momentum.

An integral method based on moment techniques and especially useful for compressible laminar flows is presented. The describing partial differential equations are first transformed to the Levy-Lees variables and then converted to integral conditions with eta to the mth power as a weighing factor. A technique for handling the variation in transport properties which explicitly arises for m>0 is described. The resultant equations are applied for m=0,1 with the commonly employed fourth and fifth degree polynomial profiles for velocity and stagnation enthalpy. The distinct classification of similar and nonsimilar flows within the same analytic framework is emphasized. The analysis is applied to a variety of flows for which more accurate results are available and is found to yield satisfactory results in most cases. Therefore, the present method is considered to improve somewhat the conventional integral method (m=0) without excessive labor. (Author)

AD-612 106 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
IMPACT OF AN ELASTIC WEDGE ON A COMPRESSIBLE FLUID,
by D. Feit, R. Skalak, and H. Bleich. Nov 64, 61p
Technical rept. no. TR-35, CU-1-64 ONR-266(86)-CE
Contract Nonr26686, Proj. NR064 428

Unclassified report

Descriptors: (*Impact shock, Fluids), (*Wedges, Impact shock), Surfaces, Compressive properties, Water entry, Hydrodynamics, Landing impact, Seaplanes, Reentry vehicles, Guided missiles, Ships, Blunt bodies, Integral equations, Numerical analysis, Perturbation theory, Elasticity, Velocity, Steel, Aluminum, Pressure, Mathematical models.

The impact of an elastic or flexible body on the surface of an inviscid compressible fluid is considered. The pressure and velocity fields generated by the impact are computed by a numerical method based on an integral equation formulation of the problem. Each potential is represented by an integral over unknown source distributions. The boundary conditions in terms of these representations lead to integral equations on these source distributions. A numerical scheme for the solution of these equations is presented and sample computations are carried out for steel and aluminum wedges impacting on water. A simplified model of an elastic wedge impact is also presented in which the elastic body is replaced by a flexible boundary. The results for the flexible boundary impact are compared to those from the more exact formulation. Both cases are also compared to the results for the impact of a rigid wedge which was considered in an earlier investigation. It is found that the rigid wedge diffraction is the primary effect in all the cases considered and that the influence of the elasticity in the cases of aluminum or steel on water is secondary. (Author)

AD-612 108 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

Ordnance Research Lab., Pennsylvania State Univ., University Park.
EFFECTS OF CAVITATION ON PERIODIC WAKES BEHIND SYMMETRIC WEDGES,
by J. O. Young. 24 Feb 65, 65p
Technical Memo. no. TM-508-2451-02
Contract NOw65 0123d

Unclassified report

Descriptors: (*Cavitation, Wake), (*Wake, Cavitation), (*Wedges, Wake), Vortices, Bubbles,

Frequency, Turbulent boundary layer, Motion pictures, Stroboscopes, Water tunnels, Measurement.

Measurements of the shedding frequency and spacing of cavitating vortex street wakes were made for four wedge models having apex angles of 15, 30, 60 and 90 degrees. The wake pattern made visible by the presence of cavitation bubbles enabled measurements of the shedding frequency and vortex street spacing to be taken. It was found that the cavitation produced negligible effects on the shedding frequency with decreasing cavitation number down to as low as half the incipient cavitation number. Further decrease in the cavitation number produced an increase in the shedding frequency to a maximum value followed by a decrease with a general decay to random shedding. The analysis of high speed motion pictures demonstrated a general decrease in the cross-stream spacing of the two rows of vortices with decreasing cavitation number. The longitudinal spacing of vortices in the same row also decreased with decreasing cavitation number followed by a rapid increase at cavitation numbers lower than that producing the peak frequency. (Author)

AD-612 109 Div. 9
CFSTI Prices: HC$1.00 MF$0.50

Montana State Univ., Missoula.
ON THE SOLUTION OF THE GENERAL WATER WAVE PROBLEM,
by R. P. Banaugh. Dec 64, 22p Technical rept. TR-1
Unclassified report

Descriptors: (*Water waves, Boundary value problems), (*Fluid mechanics, Potential theory), Incompressible flow, Surface properties, Containers, Integral equations, Green's function.

A method of solution is given for the general transient motion of the free surface of a liquid. No restrictions are placed upon the amplitudes of the waves nor on the shape and depth of the fluid container. In addition, the container may be moving or stationary in time. (Author)

AD-612 129 Div. 9, 26
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
CONTROL, AMPLIFICATION, AND FLUIDS,
by Billy M. Horton. 1964, 14p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64. Volume I, AD-611 432.

Descriptors: (*Fluid flow, Amplifiers), (*Amplifiers, Fluid flow), (*Control systems, Fluid flow), Computer logic, Timing circuits, Control systems, Feedback, Servomechanisms.

Military applications of fluid amplification currently being investigated include: logic and timing circuits for ordnance; rocket thrust vectoring, missile attitude control; automatic piloting of aircraft; hydrofoil control; jet engine control; heart massaging; and artificial respiration. It is a little early to say just how far this new medium will go in each of these fields, but the inherent advantages of simplicity and ruggedness give strong impetus to the work. The term 'simplicity' above does not necessarily refer to the state of understanding necessary to cause an all-fluid system to work properly. In fact, each device having significantly different characteristics usually points out the need for additional fundamental knowledge of fluid flow. The resulting practical impetus to research activity is aided by the realization that all-fluid systems can 'think' in the manner of electronic systems (though not nearly as fast) and that full exploitation of this capacity requires better analysis and synthesis of fluid flow phenomena in order to permit more orderly design of fluid systems. (Author)

AD-612 168 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Colorado State Univ., Fort Collins. Fluid Dynamics and Diffusion Lab.
AN EXPERIMENTAL STUDY OF TURBULENT BOUNDARY LAYER STRUCTURE.
Final rept.,
by E. J. Plate and V. A. Sandborn. Dec 64, 49p
Rept. no. CER64EJP-VAS37
Grant DA SIG36 039 62G24
Unclassified report

Descriptors: (*Turbulent boundary layer, Surfaces), Velocity, Temperature, Aerodynamic characteristics, Gas flow, Surface properties, Thermal properties, Distribution, Resistance thermometers, Thermocouples, Wind tunnels, Calibration, Pressure, Measurement, Mathematical analysis.

The report covers work done in preparation for a systematic investigation of the nature of aerodynamic roughness, and of the effect of thermal stratification on the turbulence structure in forced convection environments over rough and smooth surfaces. The investigations are based on data taken in a meteorological wind tunnel. After completion of the tunnel check out, exploratory measurements were made of the distributions of velocity and temperature in a thermally stratified flow (of unstable stratification) and of the velocity profiles above small sample plates covered with different types of sand roughness. A study of the flow of air over flexible roughness was the first comprehensive study which lead to definite conclusions. While the wind tunnel was readied for experimental work, side studies were undertaken for developing techniques for measuring profiles of mean velocities and mean temperatures, and for measuring fluctuations of temperatures and of velocities.

AD-612 173 Div. 9
CFSTI Prices: HC$2.00 MF$0.50

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
TRANSIENT AIRLOADS ON A BODY OF REVOLUTION DUE TO INDICIAL SINKING AT A LARGE ANGLE OF ATTACK,
by J. Ray Ruetenik and W. Bryan Brooks.
Aug 64, 44p Rept. no. ASRL-TR-121-1
Contract AF04 694 427
Unclassified report

Descriptors: (*Bodies of revolution, Aerodynamic loading), (*Aerodynamic loading, Mathematical prediction), Slender bodies, Cylindrical bodies, Angle of attack, Vortices, Downwash, Supersonic flight, Hypersonic flight, Drag, Wings, Wind tunnels, Graphics.

A nonlinear method is proposed for predicting the airloads on a slender, pointed body of revolution due to indicial sinking at a large angle of attack at supersonic or low hypersonic speeds. The method is an extension of Miles (NAVORD 2052) linearized theory for a slender, pointed body achieved by incorporating the Bryson theory of the indicial drag of a circular cylinder for the transient

cross-flow drag on the body. Comparisons of the steady-state theory are made with wind-tunnel data to indicate the range of Mach number, angle of attack, and fineness ratio over which the method could be expected to be applicable. It is found that the method is most useful for predicting the airloads on the cylindrical portion of the body, where vortices have the largest effect on the flow. (Author)

AD-612 269 Div. 9, 12, 14
CFSTI Prices: HC$3.00 MF$0.75

David Taylor Model Basin, Washington, D. C.
ABLATION EXPERIMENTS WITH PLASTICS AT HYPERSONIC SPEEDS AND AT LOW HEAT-TRANSFER RATES,
by Vernon Van Hise and Michael J. Malia. Nov 64, 69p Rept. nos. 1903, Aero-1082
Unclassified report

Descriptors: (*Ablation, Nose cones), (*Nose cones, Plastics), (*Plastics, Nose cones), Polyethylene plastics, Halocarbon plastics, Hypersonic flow, Heat transfer, Model tests, Aerodynamic heating, Blunt bodies, Conical bodies, Stagnation, Spikes, Schlieren photography.

The ablation behavior of the plastics polyethylene, Teflon, and polycarbonate has been studied for various model configurations. Tests were conducted at Mach numbers of 7.0 and 9.3 and at low convective heating rates with stagnation temperatures about 1350F and stagnation pressures about 300 psia. A few initial tests concerned a flat-plate shape and a flat-faced disk shape. These tests included melt flow observations and some crude comparison studies of the various materials. The remaining tests, which represent the bulk of this investigation, concerned two dozen plastic coneshaped models which were exposed to wind tunnel conditions for various durations up to 60 seconds. Shape change studies were made of these conical models using as control devices, ablation rods ejected from the apex and flow-separation ablation spikes. It was seen that, with proper matching of materials, shape changes in the conical models could be virtually eliminated by means of apex ejection. The ablation spikes were found to maintain a conical apex region by shifting the heat load downstream where it could be absorbed with relatively little shape change. (Author)

AD-612 286 Div. 9
CFSTI Prices: HC$4.00 MF$1.00

Gas Dynamics Lab., Princeton Univ., N. J.
HYPERSONIC FLOW OVER A WEDGE WITH UPSTREAM NONUNIFORMITIES AND VARIABLE WEDGE ANGLE,
by A. R. George. Dec 64, 150p Rept. no. 695
Contract AF49 638 1271; Grant AF AFOSR112 63
AFOSR 65-0002
Unclassified report

Descriptors: (*Wedges, Gas flow), (*Hypersonic flow, Wedges), (*Supersonic flow, Wedges), (*Shock waves, Vortices), Stability, Perturbation theory, Partial differential equations, Numerical analysis, Boundary layer, Geometric forms, Graphics, Series.

The paper analyzes the supersonic and hypersonic flow over a wedge placed in a parallel but non-uniform free stream. The free stream property or velocity gradients are assumed to be small and in the spanwise direction. The substitution principle allows the transformation of a general non-uniform parallel free stream into one with constant velocity. In both the supersonic and hypersonic cases a perturbation analysis is used giving linear theories. Thus superposition is valid under certain restrictions and the problem treated is taken to be a small spanwise step in free stream properties. As the flow will then be conical the problem may be reduced to dependence upon only two independent variables. For hypersonic flows the perturbations of a strong-shock, slender wedge flow due to either a free stream property or wedge angle discontinuity are obtained. The primary complicating features of the analysis are finding the shape of the perturbed shock wave and the treatment of the vorticity introduced by the curvature of the shock wave.

AD-612 372 Div. 9, 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON UNIFORMLY ACCELERATED MOTION OF FLAT PLATE IN VISCOUS COMPRESSIBLE GAS,
by V. V. Sychev and N. S. Avanesova. 12 Feb 65, 15p
FTD-MT-64-541
TT 65-61814
Unclassified report
Edited machine trans. of Zhurnal Vychislitel'noi Matematiki i Matematicheskoi Fiziki (USSR) 1963, v. 3, no. 6, p. 1067-1076.

Descriptors: (*Flat plate models, Motion), (*Shock waves, Numerical analysis), (*Thermodynamics, Compressible flow), Gas flow, Viscosity, Enthalpy, Cooling, Boundary layer, Surface properties, Acceleration, Thermal insulation, Angle of attack, USSR.

AD-612 407 Div. 9
CFSTI Prices: HC$3.00 MF$0.75

Training Center for Experimental Aerodynamics, Rhode-Saint-Genese (Belgium).
LAMINAR SEPARATION IN SUPERSONIC FLOW.
Final rept. for 1 Nov 63-31 Oct 64,
by Jean J. Ginoux. Oct 64, 75p
Grant AF EOAR64-7
AFOSR 65-0352
Unclassified report

Descriptors: (*Supersonic flow, Separation), (*Vortices, Heat transfer), (*Swept-back wings, Vortices), (*Heat transfer, Supersonic flow), Boundary layer, Aerodynamic heating, Aerodynamic control surfaces, Aerodynamic loading, Two-dimensional flow, Models (Simulations), Heat transfer coefficients, Reynolds number, Wedges, Pressure, Belgium.

Detailed experimental investigations were made at a Mach number of 2.21 of laminar flows over ramps, backward facing steps and swept back wings. Large spanwise variations of the heat transfer coefficient (h) were measured, with two different techniques, in the reattachment region of the flow over a backward facing step and were related to streamwise vortices present in the laminar boundary layer. Peaks in h much larger than the turbulent value were measured. By comparing spanwise total head and heat transfer rate distributions, Reynolds analogy was found to apply quantitatively for reattaching flows with streamwise vortices. The effect of free-stream Reynolds number and of leading edge sweep, accuracy of machining, thickness and bevel angle on the intensity of streamwise vortices present in the boundary layer on swept back wings was investigated. Flow separation was detected at the leading edge. A regular pattern of streamwise vortices of small wave length was observed outside of the boundary layer.

AD-612 411 Div. 9, 15
CFSTI Prices: HC$1.00 MF$0.50

Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.

THE CIRCLE AT LOW REYNOLDS NUMBER AS A TEST OF THE METHOD OF SERIES TRUNCATION, by Milton Van Dyke. Oct 64, 17p
Rept. no. SUDAER-211
Contract AF49 638 1274
AFOSR 64-1832

Unclassified report

Descriptors: (*Series, Partial differential equations), (*Incompressible flow, Cylindrical bodies), Boundary layer, Stagnation point, Turbulence, Reynolds number, Shock waves, Boundary value problems, Numerical analysis, Spheres, Viscosity, Drag, Integration, Rings.

A semi-analytical scheme of successive approximations is described for treating elliptic differential equations. As an extreme test of the method, it is applied to incompressible viscous flow past a circular cylinder. For the Oseen equations the first approximation is found analytically and the second numerically. The results for drag and eddy formation appear to approach the true solution satisfactorily. For the Navier-Stokes equations only the first approximation was calculated, giving drag that agrees only qualitatively with experiment. (Author)

AD-612 415 Div. 9, 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EXPERIMENTAL RESEARCH OF NATURAL OSCILLATIONS OF A SQUARE PLATE IN A SUPERSONIC FLOW, by G. N. Mikishev. 9 Mar 65, 11p FTD-TT-64-1079
TT 65-61824

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1959, no. 1, p. 154-157.

Descriptors: (*Metal plates, Oscillation), (*Supersonic flow, Flutter), (*Flutter, Supersonic flow), Airfoils, Structural parts, Resonance, Wind tunnels, Flutter simulators, USSR.

Investigation is made of the natural oscillations (flutter) of a flat square plate in a supersonic flow at Mach 1.7, 2.3, and 3 for the case where two edges of the plate are perpendicular to the flow and fastened and two edges parallel to the flow are open. The results of the experiment are compared with a theoretical solution. (Author)

10. Fuels and Combustion

AD-611 529 Div. 10, 4, 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE DEPENDENCE BETWEEN THE VALUE OF THE HEAT PRODUCTION COEFFICIENT AND THE LOWER HEAT OF FUEL COMBUSTION,
by I. E. Bespolov, A. V. Guseva, and O. I. Timonicheva. 5 Feb 65, 8p FTD-TT-64-936
TT 65-61774

Unclassified report

Unedited rough draft trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) 1963, v. 8, no. 4, p. 64-65.

Descriptors: (*Fuels, Combustion), Thermodynamics, Heat, Production, Tables, USSR.

It was established that between the values for the coefficient of heat production and the lower heat of combustion of reactive fuel, there exists a linear dependence. This dependence is expressed by the formula Q sub H = 9939 = 0.0615 K kcal/kg. The heat-producing capacity of commercial specimens of reactive fuel figured out by the above stated formula practically does not differ from the heat-producing capacity determined experimentally. The coefficient of heat production (calorific value) is computed on the basis of the data of analysis of the density and aniline point without requiring special equipment and separate premises. The results of the work done make it possible in a running control of technological units to replace a complicated method of determining the heat of combustion (GOST 5080--55) by a definite coefficient of heat producing capacity. After accumulating the materials at the factories, the method of evaluating the heat of combustion of the fuels TS-1, T-2, T-5 in accordance with the coefficient of heat-production capacity can be introduced as a standard method of testing. (Author)

AD-611 531 Div. 10
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF ADDITIVES ON THE ANTIWEAR PROPERTIES OF FUELS,
by G. I. Kichkin, I. V. Rozhkov, A. V. Vilenkin, and E. N. Kornilova. 11 Feb 65, 15p FTD-TT-64-937
TT 65-61776

Unclassified report

Unedited rough draft trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) 1963, v. 8, no. 6, p. 60-65.

Descriptors: (*Fuel additives, Wear resistance), Fuel pumps, Lubrication, Jet engine fuels, Phenols, Polymers, Surface-active substances, Amines, USSR.

Of the investigated jet fuels the best antiwear properties are had by the fuel T-1; the worst by the fuel T-2. With the rise in the temperature within the limits of 20 to 150C the antiwear properties of the fuel deteriorate considerably. With the addition to the fuel in small concentration (0.01% by weight) of antiwear substances developed for oils the antiwear properties of the fuel are improved almost to the same level as with the addition to the fuel of antioxidants and stabilizer-dispersants. The adding to fuels for jet engines of some types of surface-active substances - phenols, alkylphenols, phenylene-diamines- makes it possible at the same time to improve their stability during storage and improve their antiwear properties. (Author)

AD-611 549 Div. 10
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THEORY OF IGNITION OF CONDENSED SYSTEMS BY A GLOWING SURFACE,
by V. N. Vilyunov and O. B. Sidonskii. 11 Feb 65, 9p FTD-TT-64-956
TT 65-61782

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 152, no. 1, p. 131-133.

Descriptors: (*Fuels, Ignition), (*Ignition, Theory), Thermodynamics, Thermal conductivity, Surfaces, Pyrolysis, Combustion, USSR.

Consideration is given to the problem of the ignition of nonvolatile condensed systems, in the volume of which there occur totally exothermic chemical reactions, by a hot wall.

AD-611 608 Div. 10, 27

Instituto Nacional de Tecnica Aeronautica, Maurid (Spain).
COMBUSTION OF LIQUID MONOPROPELLANTS AND BIPROPELLANTS IN DROPLETS,
by C. Sanchez Tarifa, P. Perez del Notario, and F. Garcia Moreno. 1962, 22p
Contract AF61 052 221
AFOSR 2498

Unclassified report

Pub. in Mono. Symposium (International) on Combustion (no. 8) Pasadena, 28 Aug-3 Sep 60, Proceedings Baltimore, 1962, papers no. 109 p1035-56 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Combustion, Liquid rocket propellants), (*Monopropellants, Combustion), (*Bipropellants, Combustion), Drops, Reaction kinetics, Burning rate, Flames, Boundary value problems, Differential equations, Hydrazine, Acetates, Nitric acid, Bromine, Hydrogen, Alcohols, Heat of activation, Heat of reaction.

Theoretical and experimental results of an investigation on the combustion or decomposition of monopropellant droplets in an inert atmosphere, and on the combsution of bipropellant systems consisting of fuel (oxidizer) droplets in the vapor of an oxidizer (fuel) are given. Combustion of droplets was studied considering chemical kinetics, diffusion of species of different molecular weight and different Lewis-Semenov numbers. It was shown that for an infinite reaction rate an asymptotic solution of the problem is obtained, which is only strictly applicable when either the droplet radius or the pressure tends to an infinite value. It was shown that chemical kinetics influences the process and that the controlling parameter is the ratio of the activation energy to the heat of reaction.

AD-611 782 Div. 10, 30
CFSTI Prices: HC$3.00 MF$0.75

Arizona Univ., Tucson.
THE DESIGN OF RESEARCH APPARATUS FOR CONSTANT-VOLUME COMBUSTION PROCESSES.
Master's thesis,
by Everett E. Anderson. 1964, 66p
Contract AF33 608 1038

Unclassified report

Descriptors: (*Combustion chambers, Design),

(*Laboratory equipment, Combustion), (*Pressure vessels, Combustion chambers), Control, Temperature, Pressure, Ignition, Water vapor, Flame propagation, Safety, Steel, Glass, Igniters, Photographic recording systems, Mathematical analysis, Stresses, Spheres.

A design for the construction and selection of apparatus for constant-volume combustion processes research is presented. A discussion of the design criteria and calculations with regard to temperature, pressure, material, etc., is made. Complete engineering drawings and material listings are included in order that this paper may be used in the actual construction of a constant-volume spherical bomb and selection of the associated equipment. (Author)

AD-611 820 Div. 10, 9
CFSTI Prices: HC$1.00 MF$0.50

Royal Aircraft Establishment, Farnborough (England).
THE STABILISATION OF DETONATION WAVES BY MEANS OF BLUFF BODIES,
by M. P. Samozvantsev. Jan 65, 11p
Lib-Trans-1088
TT 65-61788

Unclassified report

O Stabilizatsii Detonatsionnykh Voln pri Pomoshchi Plokhoobtekaemykh Tel, trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) 1964, no. 4, p. 126-129.

Descriptors: (*Detonation waves, Stabilization), Combustion, Inition lag, Spheres, Supersonic flow, Flames, Kinetic theory, Equations of state, Shock waves, USSR.

The flow of a combustible mixture past a bluff body is analysed taking into account the ignition delay, so that a flame-front is formed some distance downstream of the bow shock. From a study of the results of an experiment on a sphere in a ballistic range, approximate criteria for the existence of a Chapman-Jouguet detonation wave are established. (Author)

AD-612 005 Div. 10, 27

Stevens Inst. of Tech., Hoboken, N. J.
A POROUS PLUG BURNER TECHNIQUE FOR THE STUDY OF COMPOSITE SOLID PROPELLANT DEFLAGRATION ON A FUNDAMENTAL LEVEL AND ITS APPLICATION TO HYBRID ROCKET PROPULSION.
Technical rept.,
by Robert F. McAlevy, III and Suh Yong Lee. 1964, 28p Rept. no. ME-RT-65002, 63-496
Contract Nonr26348, Proj. NR092 512

Unclassified report

Pub. in Progress in Astronautics and Aeronautics (U. S.) v15 p583-608 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Solid rocket propellants, Deflagration), (*Deflagration, Simulation), (*Hybrid propellants, Burners), Porous materials, Pellets, Ammonium compounds, Perchlorates, Halocarbon plastics, Styrene plastics, Acrylic resins, Methane, Oxygen, Flames, Combustion, Test equipment.

The composite solid propellant deflagration process was simulated successfully by means of a novel burner technique that permits ready experimental control of the factors that affect the process, and over a broader range than can be produced with an actual propellant. Burners composed of ammonium perchlorate pellets through which methane was passed and thermoplastic fuel pellets through which oxygen was passed were studied at atmospheric and subatmospheric pressures; small thermocouples were employed to obtain temperature profiles through the flame zone of the burners. The generally accepted composite propellant flame zone structure was verified, although certain basic tenets of the two competing theoretical models of others, both lying within the framework of this structure, were found to be invalid. In addition to its utility as a tool for fundamental combustion research, the technique holds great promise as a means of significantly improving the performance characteristics of conventional hybrid rocket motors. Specifically, the consumption rate of the solid component can be increased by a factor approaching 100 and the combustion efficiency of the system can be markedly improved simply by employing a porous plug geometry. (Author)

AD-612 057 Div. 10
CFSTI Prices: HC$4.00 MF$0.75

Aeronutronic, Newport Beach, Calif.
REFLECTION AND SCATTERING OF SOUND BY FLAMES.
Final technical rept.,
by H. M. Wight. 30 Nov 64, 108p Pub. no. U-2931
Contract AF49 638 1106
AFOSR 65-0432

Unclassified report

Descriptors: (*Solid rocket propellants, Combustion), (*Flames, Acoustic properties), (*Combustion, Stability), Sound, Scattering, Attenuation, Noise, Propagation, Aluminum, Polyatomic molecules, Turbulence.

The report describes acoustic measurements taken with various laboratory flame systems. These involved (1) determination of the acoustic scattering and attenuating characteristics of an open premixed propane flame, (2) determination of the attenuation of open solid propellant flames containing varying aluminum concentrations, and (3) determination of the acoustic combustion noise emission characteristics of various solid propellants. The acoustic attenuation, measured with a collimated sound beam propagating through various open gas and solid propellant flames, was extremely high. The observed attenuation coefficient was at least two orders of magnitude in excess of that attributable either to classical viscous and thermal conductive losses or to molecular relaxation losses. Acoustic scattering measurements indicated intense lateral scattering to be the probable cause of the high attenuation. An acoustic scattering theory was developed in conjunction with a postulated model for a turbulent flame. The acoustic combustion noise generated by burning small slabs of solid propellant possessed a continuous broadband spectrum of high amplitude. (Author)

AD-612 137 Div. 10, 25
CFSTI Prices: HC$1.00 MF$0.50

Ballistic Research Labs., Aberdeen Proving Grounds, Md.
MODAL ANALYSIS OF TRANSIENT VIBRATION PROBLEMS IN LINEARLY VISCOELASTIC SOLIDS,
by Alexander S. Elder. 1963, 16p

Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Solid rocket propellants, Viscoelasticity), (*Viscoelasticity, Vibration), (*Vibration, Analysis), Oscillation, Integral transforms, Partial differential equations.

Transient vibration problems in linear viscoelasticity may be solved by means of the Sturm-Liouville theory provided the homogeneous boundary conditions for the free vibrations can be combined to give a characteristic equation with real roots. This characteristic equation will depend on the geometric and inertial characteristics of the system, and not on the viscoelastic properties of the solid. If all the conditions above are not satisfied, it is still generally possible to reduce the homogeneous boundary conditions to a complex frequency equation by assuming separable solutions with exp (st) as the time dependent factor. The associated modes of deflection will generally be non-orthogonal. Transient vibration problems of this type may be solved by contour integrals, which may be evaluated by residue theory or reduced to a Fourier integral by a change of variable. (Author)

AD-612 178 Div. 10, 27
CFSTI Prices: HC$3.00 MF$0.75

Stanford Research Inst., Menlo Park, Calif.
RESEARCH ON UNSTABLE COMBUSTION IN SOLID PROPELLANT ROCKETS.
Annual rept. for 1 Jan-31 Dec 64,
by L. A. Dickinson, E. L. Capener, and R. J. Kier.
13 Jan 65, 67p
Contract AF49 638 1367, Proj. PRU4865, ARPA Order 317
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Combustion), (*Combustion, Rocket motors (Solid propellant), Stability, Pressure, Burning rate, Propellants, Aluminized explosives, Diffusion, Rocket propellant grains, Flames, Thermal expansion, Ammonium compounds, Potassium compounds, Perchlorates.

Initiation of axial combustion instability in an experimental combustor, 40 inches long by 50 inches I.D., containing a radial burning grain, has been studied utilizing a wide variety of composite propellants. Where instability occurred, a correlation was found between the threshold pressure at which instability was first observed and propellant ballistic parameters, notably the linear burning rate. Fast burning propellants, containing either a catalyst or potassium perchlorate, did not sustain axial mode combustion instability. Transverse instability was observed for most non-aluminized propellants in pressure regimes where they were stable to axial combustion instability. An explanation of combustion stability criteria has been sought in terms of either mixing processes within a granular diffusion flame or a thermal explosion process. The granular diffusion flame concept appears thus far to be the more promising explanation; it predicts the stability trends observed in large solid propellant rocket motors. (Author)

AD-612 259 Div. 10
CFSTI Prices: HC$4.00 MF$1.00

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
SOLID ROCKET STRUCTURAL INTEGRITY ABSTRACTS, VOLUME I, NO. 1,
ed. by A. R. Zak. Jul 64, 132p
Contract AF04 611 9572
Unclassified report

Descriptors: (*Solid rocket propellants, Physical properties), Abstracting, Indexes, Mechanical properties, Viscoelasticity, Stresses, Test methods, Failure (Mechanics), Thermal properties, Optical properties, Analysis, Reviews, Research program administration.

Abstracts of research reports on solid rocket propellants are divided into seven major subject areas: mechanical characterization, thermal characterization, optical characterization, analytical methods, failure, special test procedures, and physico-chemical effects on mechanical properties.

AD-612 260 Div. 10
CFSTI Prices: HC$4.00 MF$1.00

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
SOLID ROCKET STRUCTURAL INTEGRITY ABSTRACTS, VOLUME I, NO. 2,
ed. by A. R. Zak. Oct 64, 124p
Contract AF04 611 9572
Unclassified report

See also AD-612 259.

Descriptors: (*Solid rocket propellants, Physical properties), Abstracting, Reviews, Numerical analysis, Computers, Mechanical properties, Viscoelasticity, Stresses, Test methods, Failure (Mechanics), Thermal properties, Optical properties, Analysis.

Contents:
The application of numerical methods to the solution of structural integrity problems of solid propellant rockets, by Charles H. Parr
Mechanical characterization
Thermal characterization
Optical characterization
Analytical methods
Failure
Special test procedures
Physico-chemical effects on mechanical behavior.

AD-612 261 Div. 10
CFSTI Prices: HC$3.00 MF$0.75

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
SOLID ROCKET STRUCTURAL INTEGRITY ABSTRACTS. VOLUME II, NO. 1,
ed. by A. R. Zak and R. A. Westmann. Jan 65, 85p
Contract AF04 611 9572
Unclassified report

See also AD-612 260.

Descriptors: (*Solid rocket propellants, Physical properties), Abstracting, Elastomers, Rupture, Mathematical analysis, Mechanical properties, Viscoelasticity, Stresses, Test methods, Failure (Mechanics), Thermal properties, Optical properties, Analysis, Polymers, Tests.

Contents:
Rupture of elastomers and propellants, by Robert F. Landel
Mechanical characterization
Thermal characterization
Optical characterization
Analytical methods
Failure
Special test procedures
Physico-chemical effects on mechanical behavior.

AD-612 361 Div. 10
CFSTI Prices: HC$1.00 MF$0.50

Philco Research Labs., Newport Beach, Calif.
THERMODYNAMIC PROPERTIES OF PROPELLANT COMBUSTION PRODUCTS.
Quarterly letter rept. no. 1, 1 May-15 Jul 64,
by D. L. Hildenbrand. 15 Jul 64, 7p
Pub. no. QLR-64-10
Contract AF49 638 1397, ARPA Order 317, Task 13
Unclassified report

Descriptors: (*Propellants, Combustion products), (*Combustion products, Thermodynamics), (*Boron, Heat of sublimation), (*Chlorides, Vapor pressure), (*Fluorides, Boron compounds), Halides, Strontium compounds, Barium compounds, Cadmium compounds, Mass spectroscopy.

The objective of the program is to provide thermodynamic data for species which are potentially important combustion products of advanced chemical propulsion systems. Enthalpy and entropy data for species of interest are obtained from equilibrium studies carried out by effusion and free-evaporation techniques, and by high-temperature mass spectrometry.

11. Ground Transportation Equipment

AD-611 789 Div. 11, 30
CFSTI Prices: HC$3.00 MF$0.75

Texas Technological Coll., Lubbock. School of Engineering.
MODERN STRESS ANALYSIS IN THE AUTOMOTIVE INDUSTRY.
Master's thesis,
by George Ernest Mangrem. May 65, 63p
Contract AF33 608 1119
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Mechanical engineering, Automotive industry), (*Stresses, Mechanical engineering), (*Test methods, Automotive industry), (*Automotive industry, Test methods), Performance (Engineering), Strain gages, Aluminum, Internal combustion engines, Connecting rods, Coatings, Vehicle chassis components, Crankshafts, Model tests, Photoelasticity, Test methods, Coatings.

Occupying an important place in automotive engineering are the various techniques that comprise experimental stress analysis. There is no single technique that is most desirable for general use, but each has its place in the laboratory or on the test road, and frequently one complements another. Recent improvements in techniques and materials along with the successes of the stress analyst, have given new confidence in the value of experimental stress analysis and changed the thinking of management. Many of the major manufacturers now start stress analysis along with basic design and thereby provide a continuous evaluation which has lowered engineering and testing costs, reduced production delays, and eliminated many field failures for lower warranty cost. This report describes representative test procedures used by the industry, along with some of the accompanying modifications and results. (Author)

AD-612 136 Div. 11
CFSTI Prices: HC$1.00 MF$0.50

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
LABORATORY INVESTIGATION OF THE MOBILITY OF PNEUMATIC TIRES IN COHESIONLESS SOIL,
by D. R. Freitag and C. J. Powell. 1964, 16p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Tires, Performance (Engineering)), (*Trafficability, Sand), Loading (Mechanics), Soil mechanics, Surface properties, Adhesion, Torque, Deserts, Tensile properties, Pneumatic devices, Test equipment, Factor analysis, Geometric forms, Motion.

From the experience to date it can be stated that the test equipment, particularly the single-wheel test carriage, has made it possible to conduct rapidly a large number of soil-tire tests under a broad variety of controlled conditions. Some special tests have shown that the single-wheel data can be related readily to the performance of an actual 4x4 vehicle. The results of these tests show that a tire's performance varies in a regular and systematic way in response to the three primary independent variables of soil strength, tire load, and tire deflection. In a particular test condition, the amount that a tire sinks and slips is related to the other test variables. However, except in a very general sense of the word, it has not been possible to correlate the performance data for all tire sizes and shapes by means of a single general expression. (Author)

12. Guided Missiles

AD-611 465 Div. 12, 15, 25

General Electric Co., Philadelphia, Pa.
EQUATIONS FOR THRUST PROGRAMS,
by V. G. Szebehely. 1959, 13p
Contract AF49 638 814
AFOSR TN-60-815

Unclassified report

Pub. as International Astronautical Congress (NO. 11) Stockholm, 1960. Paper 44 (Copies available only to DDC users).

Descriptors: (*Orbital trajectories, Guidance), (*Differential equations, Orbital trajectories), (*Thrust, Guidance), Force (Mechanics), Optimization, Lunar trajectories, Interplanetary trajectories, Solar sails, Celestial mechanics, N-body problem.

A new analytical technique is presented which considers guidance and the determination of thrust programs as inverse trajectory problems. The trajectory of a body is uniquely determined-excepting trivial special cases-if the force field and the initial conditions are given. The inverse problem, i.e. determine the force acting on a vehicle which, with given initial conditions will describe a given oribt or trajectory, does not possess unique solution. The force acting on the vehicle is separated into two parts, one representing the given gravitational field, the other-to be determined-is associated with the vehicle produced propulsion, orbit correction or guidance force. It is shown that for a predetermined orbit the determination of this second force requires the solution of differential equations. Several sets of functions are obtained satisfying the problem and several special examples, related to lunar and interplanetary missions, are mentioned. Optimization techniques emerging naturally are discussed. The technique is applied to the problem of solar sails with variable sail angle and to the restricted three body problem. (Author)

AD-611 517 Div. 12, 2, 15

Space Sciences Lab., General Electric Co.,
Philadelphia, Pa.
THE GENERALIZED INVERSE PROBLEM OF ORBIT COMPUTATION,
by V. G. Szebehely. 1961, 23p
Contract AF49 638 814
AFOSR 435

Unclassified report

Pub. in Space Research (Netherlands) v2 p318-38 1961 (Copies available only to DDC users). Proceedings of the International Space Science Symposium (no. 2) held at Florence, Italy, 10-14 Apr 61.

Descriptors: (*Orbital trajectories, Determination), (*Celestial mechanics, Orbital trajectories), N-body problem, Guidance, Thrust, Perturbation theory, Dynamics, Motion, Gravity.

The basic problem of celestial mechanics - finding the motion for given initial conditions in a given force field - is inverted by asking for force fields which result in either a specific orbit or which allow to obtain a closed form solution of the equations of motion. The first case leads to a generalized concept of guidance and thrust programs, while the second opens the way to finding new closed form solutions for slightly modified n-body (n > 2) gravitational fields. The problem discussed in this paper is a generalization in purpose and in method of the classical problem of orbit determination in celestial mechanics. It allows the determination of classes of functions which either furnish optimization opportunities of the guidance problem (first case) or furnish overall field modifications which allow closed form solutions (second case) applicable to perturbation calculations as reference orbits with predetermined approximations. Establishing new reference orbits for perturbations and formulating a concise and systematic method of guidance analysis are the two main results presented in the paper. (Author)

AD-611 568 Div. 12
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ESTABLISHING OBJECTIVES, MEASURES, AND CRITERIA FOR MULTI-PHASE COMPLEMENTARY ACTIVITIES,
by Sidney I. Firstman and David S. Stroller.
Jan 65, 25p Rept. no. P-3062

Unclassified report

Descriptors: (*Checkout procedures, Launch vehicles (Aerospace)), (*Systems engineering, Mathematical models), Spacecraft, Launching, Operations research, Probability, Optimization, Management planning.

AD-611 574 Div. 12
CFSTI Prices: HC$6.00 MF$1.25

Rocketdyne, Canoga Park, Calif.
FEASIBILITY INVESTIGATION OF A MOVING BELT RADIATOR.
Summary rept. for 15 Mar 62-15 Apr 63,
by J. A. Speeds and L. E. Fuller. Aug 63, 220p
Rept. no. R-3668-4P
Contract AF33 657 8127
ASD TDR-63-551

Unclassified report

Descriptors: (*Radiators, Spacecraft), Space propulsion, Auxiliary power plants, Heat exchangers, Heat transfer, Conveyors, Space environmental conditions, Simulation, Controlled atmospheres, Vacuum apparatus, Mechanical drawings, Photographs, Graphics, Feasibility studies.

This report covers the first year of a research program on the feasibility of a novel concept for the rejection of waste heat in space--the moving belt radiator. Chief concerns of the program are: (1) materials seizure, (2) thermal conductance, (3) fatigue of the belt materials, and (4) high-temperature, high-speed bearings, all in the hard vacuum environment of space. The facility required for achieving the ultrahigh vacuum in a clean environment was completed and three ultrahigh vacuum seizure and heat transfer test rigs were put into operation. In addition, two ultrahigh vacuum, high-temperature bearing test rigs were built and bearing material tests were initiated. (Author)

AD-611 772 Div. 12, 25
CFSTI Prices: HC$9.80 MF$3.00

Research and Advanced Development Div., Avco Corp.,
Wilmington, Mass.
THERMAL PROTECTION SYSTEMS. APPLICATION RESEARCH OF MATERIALS PROPERTIES AND STRUCTURAL CONCEPTS.
Final rept. for 11 Jul 60-31 Dec 61,
by Henryk Hurwicz and Robert Mascola. Jan 65, 677p
Rept. no. RAD-TR-62-14
Contract AF33 616 7483, Proj. 7381, Task 738101
ML TDR-64-82 Unclassified report

Descriptors: (*Heat shields, Reentry vehicles), (*Reentry vehicles, Heat shields), Aerodynamic heating, Thermal insulation, Cooling, Ablation, Transport properties, Systems engineering, Heat-resistant materials, Guided missile simulators, Model tests, Test facilities, Correlation techniques, Numerical analysis, Performance (Engineering), Design, Thermal properties, Structures, Mathematical analysis, Enthalpy, Stagnation point, Weight, Heat transfer, Boost-glide vehicles.

Pertinent factors affecting the function of thermal protection systems are reviewed with emphasis on glide re-entry applications. Review is made and new information is generated in the areas of: (1) system, material, and design performance criteria needed for evaluation, (2) methods and techniques necessary for experimental and theoretical acquisition of the necessary parameters, (3) correlation of data to present information for the material selection and development effort, and protection system design use, (4) design and development techniques for built-up shield - structure components (vehicle sizing), and (5) basic mechanisms of heat and mass transfer associated with the mode of heat absorption or dissipation and of load carrying and transmission capacity.

AD-611 801 Div. 12, 26
CFSTI Prices: HC$3.00 MF$0.75

ASTRO, Van Nuys, Calif.
TRANSPIRATION-FILM COOLING STUDY USING SPIRAL-WOUND RIBBON NOZZLE.
Quarterly progress rept. no. 1, 9 Nov 64-31 Jan 65, by J. E. Ahern, A. R. Nagy, Jr., G. A. Yankura, and D. R. Ayres. Feb 65, 66p Rept. no. 25,156
Contract AF04 611 10387, Proj. 360

Unclassified report

Descriptors: (*Film cooling, Rocket motor nozzles), (*Rocket motor nozzles, Film cooling), Performance (Engineering), Instrumentation, Diffusion bonding, Welding, Simulation, Filament wound construction, Mandrels, Manufacturing methods, Stainless steel, Aluminum, Copper, Tantalum, Sheets, Simulation, Heat transfer, Thickness, Programming (Computers), Analog computers, Mathematical analysis.

The program consists of an analytical and experimental evaluation of the cooling capability of a nozzle design made by the spiral-wound-nozzle method. During the first quarter, the following work was accomplished: (1) The analytical study was essentially completed and the equations for the performance study were selected or developed. Sections of the digital computer program were completed and are being checked out. A simple electrical analog was built for checking out the computer program. (2) Initial trials of diffusion welding and diffusion bonding of aluminum, copper, stainless steel, and tantalum indicated very promising results for bonding of the structure without blockage of the coolant passages. (3) The laboratory bench test apparatus was completed and the initial shakedown test run completed satisfactorily. Evaluation of instrumentation techniques is in progress and initial use of ceramic-coated fine wire indicates promise for temperature measurements in this application. (Author)

AD-612 014 Div. 12, 7
CFSTI Prices: HC$6.00 MF$1.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
PROGRAM ROE (REFLECTOR ORBITAL EXPERIMENT). PART I. PRELIMINARY DESIGN: FLIGHT TEST SYSTEM.
Rept. for 1 Jul-4 Oct 63.
Dec 64, 253p LMSC-A704576
Contract AF33 657 10668, Proj. 3145, Task 314502
APL TR-64-132 P1

Unclassified report

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See also AD-612 015, AD-612 016.

Descriptors: (*Solar radiation, Reflectors), (*Reflectors, Solar radiation), (*Satellites (Artificial), Solar radiation), Orbital trajectories, Expanded plastics, Solar panels, Temperature, Calorimeters, Radiometers, Test vehicles.

Work lay largely in three areas: (1) a systems engineering preliminary design study, (2) component and vehicle integration studies, and (3) fabrication and test of selected components. It became apparent that: Data obtained from scaled versions of solar reflectors would not be pertinent to development of full-scale reflectors. Major attention should be directed to the structural integrity of large thin-walled or thin-sectioned space structures. Before development of solar reflectors, with confidence, present reflector analytical techniques will have to be modified, or new ones evolved. The calorimeter/radiometer instrumentation used at the focal zone for flight-test-data purposes requires an intensive development program. The foamed and rigidized-in-space reflector concept requires the selection of suitable orbits, to assure that the foaming mechanics will take place in an environment of stable temperature flux during the ridigizing process.

AD-612 015 Div. 12, 7
CFSTI Prices: HC$4.00 MF$1.00

Lockheed Missiles and Space Co., Sunnyvale, Calif.
PROGRAM ROE (REFLECTOR ORBITAL EXPERIMENT). PART II. PRELIMINARY DESIGN: UNFURLABLE METAL PETAL SOLAR REFLECTOR CONCEPT.
Dec 64, 146p Rept. no. LMSC-A668845
Contract AF33 657 10668, Proj. 3145, Task 314502
APL TR-64-132 P2

Unclassified report

See also AD-612 014, AD-612 016.

Descriptors: (*Solar radiation, Reflectors), (*Reflectors, Solar radiation), (*Satellites (Artificial), Solar panels), (*Solar panels, Satellites (Artificial)), Finishes and finishing, Plastics, Mandrels, Metals, Measurement, Styrene plastics.

A preliminary design study was conducted on the implementation of an all-metal solar reflector for an orbiting satellite experiment. The study included system and component preliminary design, certain aspects of vehicle integration design, ground feasibility testing, and the fabrication of critical or unproven components. Design and development of a ten-foot-diameter, unfurlable, metal-petal solar reflector was underway when the program was redirected to investigate the potential of developing a full-scale solar reflector. A limited program for developing techniques for the fabrication of large (40- to 60-foot diameter), unfurlable, solar-dynamic reflectors, comprised of electroformed, monocoque, nickel petals is described. Designs and parts from the original project to develop a small (10-foot diameter), unfurlable, metal-petal collector were used to complete a machine for: (1) applying plastic overlays: (2) fabricating petals and backing mandrels; (3) parting petals; and (4) applying reflective and protective coatings. The resulting reflectivity, geometrical accuracy, and specific weights were tested and correlated with four different petal designs, fabricated by the various improved techniques. (Author)

AD-612 016 Div. 12, 7
CFSTI Prices: HC$6.00 MF$1.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
PROGRAM ROE (REFLECTOR ORBITAL EXPERIMENT). PART III. PRELIMINARY DESIGN: INFLATABLE RIGIDIZED SOLAR REFLECTOR CONCEPT. VOLUME II. PARAMETRIC DESIGN STUDY OF INFLATABLE SOLAR REFLECTOR THERMAL DEFLECTIONS.
Dec 64, 274p LMSC-A702684
Contract AF33 657 10668, Proj. 3145, Task 314502
APL TR-64-132 P3 V2

Unclassified report

See also AD-612 014, AD-612 015.

Descriptors: (*Solar radiation, Reflectors), (*Reflectors, Solar radiation), (*Satellites (Artificial), Solar radiation), (*Inflatable structures), Reflectors)), Programming (Computers), Silicon compounds, Monoxides, Isocyanate plastics, Expanded plastics, Thermal properties, Thermodynamics, Density.

A computer program was developed for analysis of contour deviations as a function of the thermal environment and the physical properties of materials used in solar concentrators of an inflatable rigidizable construction. The program was applied to a study of the effects of changing various design parameters such as surface thermal properties, core density and concentrator dimensions. The detail effort consisted of establishing a digital computer program suitable for the IBM Model 7094 Fortran II Language. Instructions for use of this program are presented. Two complete source decks have been delivered to the Air Force Aero Propulsion Laboratory. (Author)

AD-612 048 Div. 12
CFSTI Prices: HC$1.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
A THEORETICAL METHOD FOR PRECISION RENDEZVOUS STATION-KEEPING.
Revised ed.,
by D. W. Eliason. 15 Dec 64, 24p
Rept. no. LMSC-6-62-64-23

Unclassified report

Revision of rept. dated 31 Oct 63, rept. no. SA/62-43/2308.

Descriptors: (*Rendezvous guidance, Spacecraft), (*Astronautics, Rendezvous guidance), (*Spacecraft, Rendezvous guidance), Rendezvous spacecraft, Rendezvous trajectories, Space stations, Navigational aids, Optical scanning, Analog systems, Systems engineering, Feasibility studies, Theory.

A method is proposed for maintaining two or more space vehicles in relatively close proximity on orbit without attachment over long periods of time. The proposed system employs a guidance and control configuration normally expected to be present in piloted rendezvous space vehicles as well as a precision optical device. The system is based on the creation of an on-board analogue of the target-vehicle motion. This is possible because of the linearity of the equations of motion with respect to the initial conditions. The on-board analogue is related to the target-vehicle system by a scale factor. The optical device is similar in some respects to devices proposed by several investigators for 'purely gravitational orbit' guidance. This study describes the possible application of such a sensor in deriving accurate relative velocity information for station-keeping. The characteristics of the device required for system feasibility are discussed and the operational sequence of the technique is described. (Author)

AD-612 066 Div. 12
CFSTI Prices: HC$3.00 MF$0.75

Arizona Univ., Tucson.
ORBITAL ALTITUDE FOR MAXIMUM LIFETIME OF A SATELLITE CAPABLE OF SUSTAINED THRUST.
Master's thesis,
by Conrad O. Forsythe. 1965, 83p
Contract AF33 608 1038

Unclassified report

Descriptors: (*Satellites (Artificial), Life expectancy), (*Orbital trajectories, High altitude), Velocity, Rockets, Ion engines, Drag, Atmosphere, Equations, Theory, Thrust, Propulsion, Density, Weight.

The existence of an optimum altitude for maximum lifetime and the effect of vehicle parameters on this altitude are investigated by varying the parameters within realistic limits and plotting the results on satellite lifetime versus orbital altitude coordinates. Only circular orbits are considered. For a chemical rocket sustaining system, maximum lifetime is achieved when the satellite is placed as high as possible. For an ion propulsion sustaining device, a maximum value of total lifetime results when the satellite is placed in orbit in the neighborhood of 10 nautical miles below the maximum altitude attainable. The maximum value is of the order of only one percent greater than the value of total lifetime that results when the satellite is placed as high as possible. For both sustaining systems, a significant increase in total lifetime at lower altitudes can be achieved. (Author)

AD-612 128 Div. 12, 6, 14, 17
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
RE-ENTRY VEHICLE FOR RADAR SELECTIVITY EVALUATIONS,
by R. M. Colton and E. B. Dobbins. 1963, 15p

Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 1964. Volume I, AD-611 432.

Descriptors: (*Materials, Reentry vehicles), (*Reentry vehicles, Radar targets), (*Target discrimination, Reentry vehicles), (*Radar targets, Targets recognition), Manufacturing methods, Mechining, Metals, Molybdenum alloys, Mechanical properties, Temperature, Glass textiles, Phenolic plastics, Nose cones, Refractory materials, Titanium alloys, Zirconium alloys, Simulation, Heat transfer, Ablation, Welding, Composite materials, Aluminum alloys.

The materials and fabrication studies conducted in this program were directly concerned with the development of re-entry vehicles which would simulate objects re-entering the atmosphere. These objects could be 'heat sink' or 'ablative' type nose cones, spent metallic or nonmetallic missile tankage, or various types of spacecraft structural members. The identification of the re-entering object and its position in space is quite important in determining whether it is an actual warhead-bearing missile or just innocuous 'space garbage.' Two types of materials were selected for the test vehicles, a refractory metal (Mo-TZM, molybdenum alloy) which produces a metallic ionization pattern upon re-entry and represents the heat sink type metallic material, and a nonmetal (phenolic-impregnated fiberglass) representing the ablative type material, which produces an ionization pattern possessing characteristics different from the type observed with metallic type materials. These two materials would thus be representative of most man-made objects which conceivably could

be re-entering the atmosphere. Several fabrication techniques were evaluated and developed in this study, including shear spinning, tape wrapping, plasma arc spraying and welding.

AD-612 155 Div. 12
CFSTI Prices: HC$1.00 MF$0.50

Aerospace Corp., Los Angeles, Calif.
A GRAPHICAL METHOD FOR THE DETERMINATION OF GAIN SCHEDULING FOR BOOSTER VEHICLES,
by T. C. Coffey. 14 Oct 64, 24p
Rept. no. TOR-469(5540-10)-2
Contract AF04 695 469

Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Trajectories), (*Guided missile trajectories, Scheduling), (*Scheduling, Guided missile trajectories), Automatic pilot, Control systems, Synthesis, Graphics.

A graphical technique is presented for the scheduling of ballistic missile autopilot forward-loop gain during the boost phase of flight. The procedure discussed provides an exact method for determining the 'best' piecewise constant gain scheduling for the cases of one and two gain changes. The 'best' piecewise constant gain scheduling is taken to be that scheduling which maximizes the minimum gain margin incurred during the times of

flight considered. The existence and uniqueness of 'best' gain schedules for the case of more than two gain changes is also discussed. Methods for extending the technique of this paper to situations where there exists uncertainty in the knowledge of critical gain boundries and where the upper and lower gain margins are to differ in magnitude are presented. Although this presentation has been made rather long by the desire to justify the graphical constructions employed, the actual constructions themselves require only a very short time to execute. It is hoped that the results of this paper will prove useful to the controls engineer involved in autopilot synthesis. (Author)

AD-612 199 Div. 12, 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SPACE: AN INTERNATIONAL ADVENTURE.
by Frederic S. Nyland. Dec 64, 18p
Rept. no. P-3043

Unclassified report

Descriptors: (*Astronautics, United States), (*USSR, Astronautics), Space flight, Satellites (Artificial), Meteorological satellites, Space communication systems, Manned spacecraft, Launch vehicles (Aerospace), Launching sites, Lunar probes, National defense, Costs, Military operations, Political science.

A discussion is presented on the uses of artificial satellites, the equipment required for placing vehicles into space, and the manned space flight programs of both the USSR and the United States. International political problems which have arisen as a result of space activities are also considered.

AD-612 377 Div. 12
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ASCENDING MOVEMENT OF ROCKET IN THE GRAVITATIONAL FIELD,
by A. V. Fokin. 13 Jan 65, 14p FTD-MT-64-316
TT 65-61819

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Institut Teoreticheskoi Astronomii. Byulleten', 1962. v. 8, no. 5(98) p. 335-342.

Descriptors: (*Rockets, Ascent trajectories), Motion, Flight, Gravity, Velocity, Acceleration, Combustion, Integrals, Transformations (Mathematics), Mathematical analysis, USSR.

Consideration is given to the ascending movement of a rocket, whose mass is changed according to exponential law in the earth's gravitational field without calculation of resistance of the medium. Solution is expressed by elliptical integrals of the first and second order. (Author)

AD-612 385 Div. 12, 2, 15
CFSTI Prices: HC$2.00 MF$0.50

American Mathematical Society, Providence, R. I.
SUMMER SEMINAR IN SPACE MATHEMATICS.
Final rept. for 1 Jul-9 Aug 63,
by J. Barkley Rosser. 1963, 33p
Grant AF AFOSR258 63
AFOSR 64-0723; AROD 4065:1

Unclassified report

Descriptors: (*Symposia, Mathematics), (*Mathematics, Symposia), (*Space flight, Mathematics), Astronomy, Fluid flow, Orbital trajectories, N-body problem.

The Summer Seminar in Space Mathematics was a joint undertaking of the American Mathematical Society and the Yale Dynamical Astronomy Institute. Thus, it combined the third Summer Seminar in applied mathematics with the fifth consecutive Dynamical Astronomy Institute. The purpose of the Seminar was to provide instruction, stimulation and cross-fertilization in the subjects of dynamical astronomy, mathematics and the physics of high speed flight. Mathematicians and astronomers heard from leading advanced mathematicians, astronomers and applied physicists on topics which cut across the disciplines contributing to space science. The first two weeks were mainly devoted to basic courses which provided background material in practical astronomy, elliptic orbits, basic fluid dynamics, variational calculus and the method of steepest descent, dynamic programming, and the computer workshop. In the second two weeks, in addition to basic courses in Lagrange-Hamiltonian-Jacobi mechanics and computation procedures for differential equations, special topics of interest in space activity were stressed; included were artificial satellite theory, orbit decay, the Earth-Moon system, gas flow models, shock waves in very rare gases, and heat flow with receding boundaries. The final two weeks included a great variety of advanced and specialized topics of current interest in the space sciences.

13. Installations and Construction

AD-611 626 Div. 13
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
DAVIT ASSEMBLY, TOWER AB-585()/G. EFFECTS OF PULLEY FRICTION ON DAVIT DEFLECTION,
by Alvin Schlichtmann. 6 Jan 65, 19p
Unclassified report

Descriptors: (*Hoists, Towers), Mechanics, Friction, Deflection, Bronze, Bushings, Tests, Mechanical drawings, Mechanical engineering.

The testing of the davit assemblies represents an in-house effort to evaluate the mechanical efficiency of the AB-585()/G type tower davit and pulley sheaves, and, at the same time, make a comparative evaluation of the production model with a new design of larger diameter incorporating an oilite bronze bushing. The davit shaft is composed of aluminum tubular columns of 3 inch O.D. and .125 inch wall, the upper davit tube and the lower davit tube held together by a spring loaded pin. The two cross arms are mounted perpendicular to the shaft and consist of tubular columns of the same material and dimensions. Pulley sheave slots and guards are located at the top of the davit shaft and at the ends of the cross arms. The davit assy also includes two retaining couplers for mounting and moving the davit shaft along the vertical leg of the tower, a snatch block assembly for hoisting and 250 ft. of 1/2 inch manila rope. The use of the oilite bronze bushing in the new design, 3 1/4 diameter pulley sheave, resulted in no significant reduction in pulley friction. There was no noticeable difference in davit shaft deflection which could be attributed to the effects of pulley friction.

AD-611 749 Div. 13, 2
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
CRUSHING STRENGTH AND LONGITUDINAL WAVE VELOCITY IN PROCESSED SNOW,
by James L. Smith. Jan 65, 19p
Technical rept. no. TR-137
Proj. IV0 25001A130
Unclassified report

Descriptors: (*Snow, Mechanical properties), Aging (Materials), Wave transmission, Compressive properties, Correlation techniques, Test methods, Tests, Experimental data, Tables, Michigan.

An attempt was made to establish a correlation between longitudinal wave velocity and crushing strength of processed snow and to express this relationship in a fixed set of values. The relationships as established at -10C sigma sub c = C sub 1 - 4062/15.9, for an initial density of 0.543 g/cc and sigma sub c = C sub 1 - 3097/31.8 for an initial density of 0.510 g/cc indicate that the crushing strength of a processed snow sample may be determined from measurements of longitudinal wave velocity, density, and temperature. Although this study was confined to processed snow with an initial density of 0.51 g/cc and 0.54 g/cc, the results are indicative for the normal range of density of processed snow.

AD-611 751 Div. 13, 25
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
DILATATION CONSTANTS AND COMPLEX RATIO FROM FORCED VIBRATION OF A FREE VISCOELASTIC SPHERE,
by T. M. Lee. Jan 65, 14p Research rept. no. RR-147
Proj. IV02501A130
Unclassified report

Descriptors: (*Viscoelasticity, Spheres), (*Elasticity, Mathematical analysis), Solids, Materials, Vibration, Harmonic analysis, Graphics, Tables, Mechanics.

The technique of forced vibration has been applied to the study of the properties of viscoelastic materials. It is found, through the analysis of a free sphere with a harmonic oscillating internal source, that the vibration amplitude ratio of two measuring points is associated with the complex dilatational constants and the complex ratio of the material, a quantity directly related to the complex Poisson's ratio. Therefore, from the criterion of maximum amplitude ratio (i.e. by adjusting the frequency of the source until the amplitude ratio reaches maximum), these properties can be expressed in terms of the amplitude ratios and their frequencies. For the convenience of laboratory testing, two particular amplitude ratios, in conjunction with their frequencies, have been employed for this purpose. Simple expressions are given, relating the properties of the test material to quantities measurable in the laboratory, namely the maximum amplitude ratios and their corresponding frequencies. (Author)

AD-611 859 Div. 13, 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EMPLOYMENT OF ELECTRONIC DIGITAL COMPUTERS IN STRUCTURAL MECHANICS,
by A. P. Filin. 1 Mar 65, 17p FTD-TT-64-951
TT 65-61796
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, 1964, no. 2, p. 188-192.

Descriptors: (*Digital computers, Data processing systems), (*Data processing systems, Civil engineering), (*Structures, Mathematical analysis), Structural properties, Mechanics, Mathematical prediction, Reviews, Symposia, USSR.

A review of papers presented at a conference in the city of Leningrad on the employment of electronic digital computers, in structural mechanics (structural mechanics of rod systems, theory of plates and shells, mechanics of solid medium).

AD-611 901 Div. 13, 25

Rensselaer Polytechnic Inst., Troy, N. Y.
RANDOM TRANSVERSE VIBRATIONS OF ELASTIC BEAMS,
by William E. Boyce and Bruce E. Goodwin.
9 Mar 64, 17p
Grant AF AFOSR182 63
AFOSR 65-0330
Unclassified report

Pub. in Society for Industrial and Applied Mathematics Journal (U.S.) v12 n3 p613-29 Sep 1964 (Copies not available to DDC or Clearinghouse customers). Revision of rept. dated 30 Dec 63.

Descriptors: (*Beams (Structural), Vibration), Frequency, Probability, Differential equations, Mechanics, Boundary value problems.

The problem of analyzing the frequencies of transverse vibration of random elastic beams is considered. Two types of random elements are admitted: (a) the geometry of the cross-section of the beam may be random; (b) the support mechanism at one or both ends may be random. In the first case random coefficients occur in the differential equation, which is of fourth order, and in the second case they are present in the boundary conditions. The mathematical problem is then to estimate the effects of these random coefficients upon the natural frequencies of vibration, which appear as eigenvalues of the resulting boundary value problem. More specifically, estimates for the statistical moments are sought, in particular the mean and variance, of the eigenvalues in terms of corresponding parameters associated with the random coefficient appearing in the differential equation or boundary conditions. Most of the methods discussed can be extended, at least in principle, to more general linear eigenvalue problems.

AD-612 148 Div. 13, 30
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
PERMANENT SOUTH POLE STATION. DESIGN LIMITATIONS AND CONCEPTS.
Preliminary rept.,
by James E. Schroeder. 4 Jan 61, 17p
Technical note N-397
Proj. Y F015 11 103

Unclassified report

Descriptors: (*Laboratories, Polar regions), (*Polar regions, Laboratories), Construction, Structures, Buildings, Materials, Design, Water supplies, Sanitary engineering, Fire safety, Fuels, Power equipment, Air conditioning equipment, Tables.

A preliminary review is presented of the construction limits affecting the final design of a permanent 25-man station at the South Pole and the evaluation of 12 possible design concepts. The three principal limits selected as those which will have the greatest effect on the final design of the station are (1) logistical requirements, (2) construction season and (3) construction force. For valuation of design concepts three station types--below grade, at grade and above grade, and four station layouts--train, semi-train, dispersed and composite, were considered. These 12 combinations were evaluated against ten station elements--mission and operation, construction effort, space utilization, structures, water supply, sanitation, air conditioning, fire protection, fuel and supply handling, and power generation and distribution. Tables delineating the advantages and disadvantages introduced by each element for each concept are given. (Author)

AD-612 174 Div. 13, 26, 30
CFSTI Prices: HC$5.00 MF$1.25

Naval Construction Battalion Center, Port Hueneme, Calif. Naval School.
P. E. R. T. CONSTRUCTION PROJECT NETWORK ANALYSIS,
by James E. Daly. Jul 64, 179p

Unclassified report

Descriptors: (*Management control systems, Construction), (*Management planning, Construction), (*Construction, Management planning), Management engineering, Operations research, Digital computers, Computer logic, Networks, Scheduling, Time, Costs, Structures, Buildings, Civil engineering.

Contents: An overview of P.E.R.T. adapted to construction project management; P.E.R.T. project planning and logical network sequencing; developing the network model of the project plan; manual P.E.R.T network computation; the digital computer and network analysis; time-sequenced network construction; the time-oriented bar-chart schedule; the project planner's proposal; directing progress and adjusting the schedule; network time and cost considerations; summary of budocks P.E.R.T. policy and implementation actions; the logic practice exercise solution; the steel antenna tower problem; the seabee temporary timber and steel warehouse problem; the tilt-up office building problem; the time/cost problem; the pier reconstruction problem; P.E.R.T. project computer printout examples; budocks P.E.R.T. policy and type specifications.

AD-612 248 Div. 13, 9
CFSTI Prices: HC$2.00 MF$0.50

Oklahoma Univ., Norman.
ON THE OSCILLATORY BEHAVIOR OF NATURAL CIRCULATION SYSTEMS.
Master's thesis,
by Charles George Lauderdale. 1965, 46p
Contract AF33 608 1096

Unclassified report

Descriptors: (*Fluid flow, Oscillation), (*Mechanical engineering, Nucleate boiling), (*Nucleate boiling, Oscillation), Power, Temperature, Luminescence, High-speed photography.

The data observed and recorded lead to the following conclusions regarding the behavior of the natural circulation loop studied. (1) With no cooling flow in the downcomer coils and for a given power input, the larger the restricting orifice in the downcomer the more stable the flow in the loop. (2) With minimum cooling flow - that required to maintain the riser fluid at a point just below its boiling temperature - and for a given power input, the smaller the restricting orifice the more stable the flow in the loop. (3) For a given power input, the smaller the restricting orifice in the downcomer the larger the difference in temperature between inlet and outlet to the heater. (4) Injecting air in the form of bubble streams at the bottom of the riser has been shown to have a subduing effect on oscillations peculiar to a natural circulation loop, and to allow the fluid to operate in a narrower range of temperatures of inlet and outlet. (5) The luminescent effect observed in the riser immediately before boiling requires a minimum though unknown amount of light incident on the riser tube. The effect was also observed to be pressure-dependent. (Author)

AD-612 258 Div. 13
CFSTI Prices: HC$3.00 MF$0.75

Colorado Univ., Boulder.
STRENGTH OF LAPPED SPLICES IN CONCRETE BEAMS USING HOOKS.
Master's thesis,
by Thayne Hansen Judd. 15 Jan 65, 100p
Contract AF33 608 1054

Unclassified report

Descriptors: (*Beams (Structural), Joints), (*Joints, Tensile properties), (*Hooks, Performance (Engineering)), (*Reinforcing materials, Concrete), (*Concrete, Beams (Structural)), Steel, Loading (Mechanics), Failure (Mechanics), Deflection, Bonding, Stresses, Tests, Analysis, Specifications.

The investigation was concerned with determining what splice strengths could be developed by using lapped hooks. A series of eight tests were performed using No. 8 bars only. The beam width, depth, and length for

each test were constant. One beam was tested using a straight lapped splice. The remaining beams were tested using spliced 180-degree hooks, 135-degree hooks, and 90-degree hooks. Primary results obtained were steel stress and bond stress developed under pure flexural loading. An analysis of the data reveals that spliced hooks develop about as much steel and bond stress as a straight splice of comparable length. However, it was found that a higher steel and bond stress can be developed with the 180-degree hooks when using a higher concrete strength. It was also found that the splice strength could not be appreciably increased by placing transverse bars on the inside radii of the 180-degree hooks. It is felt that the type of hook splices used in the investigation cannot be used to any advantage over the 1963 Code designed straight splice. (Author)

AD-612 262 Div. 13
CFSTI Prices: HC$5.00 MF$1.00

Massachusetts Inst., of Tech., Cambridge. School of Engineering.
INVESTIGATION OF AUTOMATED DIRECT DESIGN OF STEEL RIGID PLANAR FRAMES.
Doctoral thesis,
by Roger Adams Hadley. 18 Jan 65, 170p
Contract AF33 608 1081

Unclassified report

Descriptors: (*Structures, Design), (*Design, Automation), (*Mathematical analysis, Structures), Structural parts, Programming (Computers), Steel.

A rational design process is developed for the design of a rigid, planar frame. The design process is composed of two parts. Phase A determines the optimum design for the individual members which is considered sub-optimization. Phase B determines the optimum design for the entire structure. An automated design program was written which contained adequate controls to permit designs by the rational design process. The design program is compatible with the existing STRESS analysis system. The controls in the program allow designs satisfying the criteria of (1) minimum weight with in the constraint of allowable stresses and full column stiffness and (2) minimum weight allowing reduced column stiffness with axial load. Two rigid frames were designed using the above automated design program. The designs were optimized using the sensitivities of (a) change in volume due to change in moment and (b) change in volume due to change in cross-section. (Author)

AD-612 266 Div. 13
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
RECOVERY OF LAUNDRY WASTE WATER FOR SHORE STATIONS.
Final technical rept. for Jun 62-Dec 64,
by W. R. Nehlsen. 11 Mar 65, 16p Rept. no. TR-R-368
Proj. Y F015 99 01 055

Unclassified report

Descriptors: (*Water supplies, Naval shore establishments), (*Naval shore establishments, Water supplies), (*Wastes (Sanitary engineering), Distillation), Laundering, Flotation (Separation), Cleaning compounds, Industrial plants, Recovery, Midway.

A laundry waste-water-recovery unit was in-service tested at the Midway Naval Station Exchange Laundry. Treatment results were comparable to those obtained at NCEL, although costs were higher than previously estimated. An analysis of test results indicates that the unit is not suitable for inclusion in the functional component system. However, the process itself may be used at permanent stations to supplement water supplies by 5 to 20%. (Author)

AD-612 370 Div. 13, 8, 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SEMICONDUCTOR THERMAL PUMP BASED ON THE PRINCIPLE OF COMBINED USE OF THERMOELECTRIC EFFECTS,
by I. N. Pomazanov and P. L. Tikhomirov. 16 Feb 65, 18p FTD-MT-64-553
TT 65-61812

Unclassified report

Trans. of Elektrotekhnicheskii Institut, Leningrad. Izvestiya (USSR) 1963, no. 51, p. 94-106.

Descriptors: (*Thermoelectricity, Semiconductor devices), (*Refrigeration systems, Semiconductor devices), (*Semiconductor devices, Refrigeration systems), Semiconductors, Heat transfer, Thermocouples, Cooling, Resistance (Electrical), Thickness.

The article discusses a semiconductor thermoelectric device, whose principle of action is based on joint use of the Peltier effect and the Seebeck in one instrument, which allows heat transfer from bodies less heated to bodies more heated, directly, due to heat brought in (without the use of external sources of electric power). In principle it is possible to present a similar instrument consisting of a semiconductor thermoelectric refrigerator and, feeding its semiconductor, a thermogenerator forming a closed circuit. There appears the question about reducing to a minimum internal resistances of the thermogenerator and the thermoelectric refrigerator, and also resistances of the connecting conductors. Apparently, in the most rational construction thermocouples of generator and refrigerator must consist of thin semiconductor plates and must be short-circuited against each other.

14. Materials (Non-Metallic)

AD-611 561 Div. 14, 4
CFSTI Prices: HC$2.00 MF$0.50

General Dynamics/Fort Worth, Tex. Nuclear Aerospace Research Facility.
EFFECT OF ENVIRONMENTAL HYDROGEN PRESSURE ON THE HYDROGEN YIELD FROM X-IRRADIATED POLYETHYLENES.
Technical rept. for 1 Oct 63-30 Sep 64,
by O. H. Hill and R. P. Lightfoot. Jan 65, 36p
Rept. no. FZK-203
Contract AF29 601 6213, Proj. 6773, Task 677302
WL TR-64-150

Unclassified report

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Descriptors: (*Polyethylene plastics, Radiation chemistry), (*Radiation chemistry, Polyethylene plastics), X-rays, Decomposition, Gases, Hydrogen, Reaction kinetics, Test equipment, Test methods, Pressure, Monitors.

An experimental assembly incorporating a capacitance-type, differential pressure transducer, which provides resolutions of 0.3 micron at pressures extending to 30 mm, has been employed to monitor the effect of hydrogen environmental pressure on the hydrogen yield from X-irradiated polyethylenes. Contrary to the observations of previous researchers, the hydrogen yield is found to be independent of hydrogen environmental pressures extending up to at least 30 mm Hg. It is demonstrated that neglecting the temperature and density gradients inherent in closed-volume irradiation assemblies employing cryogenic traps to separate liberated gases into condensable and noncondensable fractions may lead to erroneous conclusions with respect to gas yields arising from the irradiation of materials. Total volatile G-values of 3.6, 3.8, and 4.0 molecules per 100 ev were obtained for Marlex 6002, Dow Ziegler (Q 917.5), and DuPont A-1410 polyethylenes, respectively, with hydrogen contributions of approximately 98 mole percent. (Author)

AD-611 575 Div. 14, 4
CFSTI Prices: HC$2.00 MF$0.50

General Dynamics/Forth Worth, Tex.
X-RADIATION-INDUCED UNSATURATION CHANGES IN MARLEX 6002 POLYETHYLENE.
Rept. for 1 Oct 63-30 Sep 64,
by O. H. Hill and T. W. Albrecht. Jan 65, 48p
FZK-204
Contract AF29 601 6213, Proj. 6773, Task 677302
WL TR-64-147

Unclassified report

Descriptors: (*Polyethylene plastics, Radiation chemistry), (*Radiation chemistry, Polyethylene plastics), Decomposition, Gases, Monitors, Infrared spectrophotometers, Infrared spectroscopy, Reaction kinetics, Hydrogen, Pressure.

An irradiation-dewar assembly was designed for use with an infrared spectrophotometer so that selected organics could be intermittently monitored during X-irradiation with maximum environmental and temperature integrity of the sample. This assembly was employed to study the temperature dependence of the rates of change of unsaturation in Marlex 6002 polyethylene. The initial rate of radiation-induced trans-vinylene formation in Marlex 6002 polyethylene is found to be 2.0±0.3 bonds per 100 ev and independent of temperature over the range of from 105 to 300K, while vinyl decay extrapolated to zero radiation dose over the same range satisfies G(-Vi) = 5.8 exp (341 (1/300 - 1/T)), with G(-Vi) representing the number of vinyl bonds disappearing per 100 ev absorbed at absolute temperature T(K). The process of trans-vinylene elimination has been observed qualitatively to be temperature-dependent over this temperature range. A 1-atm pressure of hydrogen does not change unsaturation rates. The techniques employed have certain advantages in fundamental radiation chemistry studies.

AD-611 624 Div. 14, 4

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Chemistry.
THE ELECTRONIC SPECTRA OF POLY (METHYL METHACRYLATE) ANIONS,
by D. M. Wiles and S. Bywater. 4 Sep 64, 6p
Rept. no. NRC-8223

Unclassified report

Pub. in Journal of Polymer Science, Pt. B: Polymer Letters (U.S.) v2 p1175-9 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Acrylic resins, Absorption spectrum), (*Propionic acid, Polymerization), Ions, Spectra (Visible and ultraviolet), Catalysts, Metalorganic compounds, Lithium compounds, Polymerization, Canada.

A description is given of the electronic spectra of living poly (methyl methacrylate) initiated by 1, 1-diphenyl-n-hexyllithium in toluene and in tetrahydrofuran solutions.

AD-611 644 Div. 14, 4

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Chemistry.
POLYMERIZATION OF METHYL METHACRYLATE INITIATED BY 1, 1-DIPHENYLHEXYL LITHIUM,
by D. M. Wiles and S. Bywater. 24 Jul 64, 11p
Rept. no. NRC-8226

Unclassified report

Pub. in Faraday Society. Transactions (London) v61 n505 pt 1 p150-58 Jan 1965 (Copies available only to DDC users).
Presented at the Canadian High Polymer Forum (12th), Ste. Marguerite, Que., 27-29 May 64.

Descriptors: (*Acrylic resins, Synthesis (Chemistry)), (*Propionic acid, Polymerization), (*Catalysts, Metalorganic compounds), (*Lithium compounds, Catalysis), Low-temperature research, Reaction kinetics, Esters, Molecular weight, Canada.

The low-temperature polymerization of methyl methacrylate in toluene solution was studied using 1, 1-diphenyl-n-hexyl-lithium (DPHL) as initiator. Kinetic data, rates of lithium methoxide formation, and polymer tacticities are reported for experiments at 0, -30 and -80C. The molecular weight distribution of a polymer prepared at -30C was determined. These results are compared with those obtained under comparable conditions using butyl-lithium as initiator. Much simpler kinetic behaviour occurs with DPHL than with butyl-lithium initiator. The amount of lithium methoxide formed is much smaller with the former and is, approximately, a constant fraction of initiator as is the number of molecules of low molecular weight product. The polymerization rate is first order in both monomer and initiator concentrations as expected if the number of growing polymer chains is linearly dependent on initiator concentration. (Author)

AD-611 652 Div. 14

Keck (W. M.) Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
DEFORMATIONS OF FOAMED ELASTOMERS,
by William L. Ko. 1964, 6p
Contract AF04 611 9572
Unclassified report

Pub. in Journal of Cellular Plastics (U. S.) v1 n1 p1-6 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Foam rubber, Structural properties), (*Elastomers, Deformation), Foams, Spheres, Stresses, Mechanical properties, Geometric forms.

Geometrical shapes of interstices of two types of closest packing of uniform spheres, 1) hexagonal closest packing, 2) face centered cubic closest packing are studied, and the structures of interstices of these two types of packing are used to represent those of the actual foamed elastomers. Equivalent elastic constants for these two structures are calculated in terms of the slenderness of a thread (which is a function of voids content) l squared/A where l is the length of a thread and A its cross-sectional area, and of the elastic constants of the interstices. The calculated value of Poisson's ratio of a model containing 67 percent of the interstices of hexagonal closest packing and 33 percent those of face centered cubic packing correlates fairly well with existing experimental data. (Author)

AD-611 757 Div. 14, 4
CFSTI Prices: HC$2.00 MF$0.50

General Technologies Corp., Alexandria, Va.
A STUDY OF HIGH MODULUS, HIGH STRENGTH FILAMENT MATERIALS BY DEPOSITION TECHNIQUES.
Final rept. for 1 Nov 63-31 Oct 64,
by L. G. Davies, J. C. Withers, and D. F. Bazzarre.
1 Jan 65, 39p
Contract NOw64 0176C
Unclassified report

Descriptors: (*Filaments, Manufacturing methods), (*Reinforcing materials, Filaments), Vapor plating, Boron compounds, Silicon compounds, Carbides, Boron, Titanium compounds, Borides, Beryllium, Beryllium compounds, Aluminum compounds, Oxides, Tensile properties, Coatings, Elasticity, Density.

A research program was initiated for the investigation of certain high modulus, high strength, low density materials in filament form. The primary objective of the investigation was to establish feasibility for depositing the desired materials by state-of-the-art vapor deposition techniques upon a substrate in filament form. The following materials were selected for study on the basis of their high modulus-to-density ratio: boron carbide, silicon carbide, boron, titanium boride, titanium carbide, beryllium, beryllium oxide, and aluminum oxide. The filaments were characterized by their physical appearance and by the measurement of their tensile strength. The modulus of elasticity and density was measured on representative samples of each group. All candidate materials were successfully deposited. The boron carbide, silicon carbide, and boron deposition reactions produced high quality coatings at reasonable deposition rates. The other materials produced filaments of generally lower strengths, probably due, in part, to the high crystallinity of the coating. Beryllium, beryllium oxide, and aluminum oxide had very low deposition rates. The tensile strength of the boron carbide filaments ranged from 480,000 psi to 1,130,000 psi on 0.001" tungsten substrates. The silicon carbide had tensile strength to 2,000,000 psi, and boron had strengths to 1,900,000 psi. Silicon carbide had the highest modulus of elasticity (up to 800,000,000 psi) of the materials studied, while titanium carbide with measured modulus of less than 20,000,000 psi had the lowest. (Author)

AD-611 776 Div. 14, 31
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
HYDROSTATIC PRESSURE TESTS OF GLASS-REINFORCED PLASTIC CYLINDERS WITH A TITANIUM JACKET,
by John L. Proffitt. Jan 65, 34p DTMB-1851
Projs. S F013 01 03, S F013 05 03, Tasks 0214, 1025
Unclassified report

Descriptors: (*Plastics, Filament wound construction), (*Filament wound construction, Composite materials), (*Composite materials, Filament wound construction), (*Submarine hulls, Filament wound construction), (*Glass textiles, Filament wound construction), Reinforcing materials, Stiffened cylinders, Structural shells, Titanium alloys, Model tests, Hydrostatic pressure, Rings, Steel, Aluminum alloys, Vanadium alloys, Sandwich construction, Failure (Mechanics), Stresses, Deformation, Loading (Mechanics).

Two cylindrical models were tested under hydrostatic pressure to determine the structural behavior of hulls composed of ring-stiffened, glass-reinforced plastic (GRP) cylinders surrounded by a thin titanium jacket and designed for a collapse depth of 30,000 ft. From these tests it was determined that composite fiberglass construction is feasible for deep-depth application from a static strength aspect. Furthermore, these tests indicate that composite fiberglass hulls offer higher static strength-weight characteristics than any metallic hulls currently under investigation. However, there is still a need for investigation of hull penetrations and end closures and the effect of cyclic and long-term loading on the collapse strength of such structures. (Author)

AD-611 779 Div. 14, 4, 20
CFSTI Prices: HC$3.00 MF$0.75

Pennsylvania State Univ., University Park.
AN EPR INVESTIGATION OF RADIATION PROTECTION BY AROMATIC ADDITIVES IN SYNTHETIC POLYMERS.
Master's thesis,
by Jerome J. Banaszak. Dec 64, 75p
Contract AF33 608 954 Unclassified report

Descriptors: (*Plastics, Additives), (*Acrylic resins, Radiation damage), (*Polymers, Radiation damage), (*Radiation chemistry, Polymers), (*Nuclear magnetic resonance, Polymers), X-rays, Gamma rays, Free radicals, Electrons, Nuclear spins, Paramagnetic resonance, Microwave spectroscopy, Aromatic compounds, Salicylates, Benzoates, Resorcinol, Phosphoric acids, Xylenes.

The research is a study of the protective effects against ionizing radiation that aromatic compounds provide when added to a synthetic polymer in various proportions. Since radiation damage in high polymer compounds is usually accompanied by the production of free radicals in the material, electron paramagnetic resonance (EPR) techniques were utilized to measure the extent of the free radical concentration. Comparative measurements were made of the radiation-protective effects of different aromatic additives on polymethyl methacrylate. Data obtained from the EPR spectra was correlated with some of the theories currently advanced relating free radical formation, degradation and crosslinking during polymer irradiation. Degradation or multiple chain scission, is defined as the breaking up of the long molecular chains in a polymer into smaller units, whereas crosslinking is usually associated with increasing the number of lateral linkages between polymer chains. (Author)

AD-611 799 Div. 14, 17, 26
CFSTI Prices: HC$2.00 MF$0.50

Case Inst. of Tech., Cleveland, Ohio. Dept. of Metallurgy.
AN INVESTIGATION ON THERMAL AND MECHANICAL STABILITY OF MOLD MATERIALS FOR STEEL CASTINGS.
Interim rept. for 28 Jun 63-27 Jun 64,
by Charles E. Bates and John F. Wallace. Jul 64, 48p
Contract DA33 019AMC270Z
AMRA CR64-03/1

Unclassified report

Descriptors: (*Steel, Casting), (*Molding materials, Stability), Tensile properties, Thermal properties, Surface properties, Castings, Refractory materials, Binders, Silicon compounds, Oxides, Aluminum compounds, Sodium compounds, Silicates, Minerals, Compressive properties, Sand, Clay, High-temperature research, Molding.

Test apparatus and technique were developed to measure the tensile strength of molding materials at elevated temperatures. The measurements of tensile strength obtained from this equipment permits a qualitative evaluation of the mechanical stability of the mold as molten steel enters and solidifies in the mold. The mold stability obtained with various refractory aggregate-binder combinations is a significant factor in controlling dimensional tolerances in the steel casting. Several rammed mold materials consisting of various combinations of refractory aggregates and binders were investigated for use in producing high quality steel castings. Close dimensional control of the castings was obtained with fused silica, calcined alumina and silica sand bonded with sodium silicate and green, western bentonite bonded mullite. Better casting surfaces were obtained with the fused silica aggregate. A modified sodium silicate binder utilizing silicon metal fines to promote setting was investigated. This sodium silicate-silicon fines binder combined with either fused silica or silica sand refractories provided a mold for casting steel to close dimensions with a good cast surface. (Author)

AD-611 813 Div. 14, 25
CFSTI Prices: HC$1.00 MF$0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
DIFFUSION STUDIES IN REFRACTORY MATERIALS.
Summary rept. for 1 Mar 64-28 Feb 65,
by B. J. Wuensch and T. Vasilos. 28 Feb 65, 20p
Contract Nonr426700

Unclassified report

Descriptors: (*Ceramic materials, Diffusion), (*Refractory materials, Diffusion), (*Diffusion, Refractory materials), (*Magnesium compounds, Oxides), Monoxides, Single crystals, Grain boundaries, Nickel, Cobalt, Crystals, Impurities, Calcium, Silicon, Zinc, Heat of activation, Diffusion bonding, Crystal lattices.

Progress is reported in a program to investigate the effects of imposed stress and also the presence of grain boundaries on diffusion rates in magnesium oxide is described. Loads of up to 5000 psi on samples placed in four-point loading do not appear to influence the rate of diffusion of Ni(2+) in single-crystal MgO in the temperature 1000 - 1300C. Grain boundary diffusion of Ni(2+) and Co(2+) has been observed in isolated grain-boundaries in MgO bicrystals. The effect appears to be due to segregation of impurities, principally Ca(2+) and Si(4+), at the boundary, and is not an intrinsic property of the grain boundary. Data for the diffusion of Zn(2+) in MgO have been obtained, and may be described in terms of an activation energy of 1.85 electron volts and a value of D sub o of 0.0000148 sq cm/sec. (Author)

AD-611 826 Div. 14

National Academy of Sciences-National Research Council, Washington, D. C.
NON-CRYSTALLINE SOLIDS. CONFERENCE, ALFRED, NEW YORK, SEPTEMBER 3-5, 1958,
ed. by V. D. Frechette. 1960, 255p

Unclassified report

Prepared by State Univ. of New York, Alfred, Coll. of Ceramics, under contract AF49 638 419.
Co-sponsored by Air Force Office of Scientific Research, Washington, D. C.
Available from John Wiley and Sons, Inc., New York, $15.00 p/Books in Print, 1960.

Descriptors: (*Glass, Symposia), (*Symposia, Glass), (*Reports, Glass), (*Ceramic materials, Symposia), Scattering, Light, X-rays, Integral transforms, Statistical functions, Molecular structure, Electron diffraction analysis, Silicon compounds, Dioxides, Neutron scattering, X-ray diffraction analysis, Fluorides, Chlorides, Electron transitions, Atomic energy levels, Absorption spectrum, Chromium compounds, Manganese compounds, Cobalt compounds, Magnetic resonance, Relaxation time, Solids, Dynamics, Sulfur, Selenium, Films, Physical properties.

Contents: Scattering of radiation by non-crystalline media, by P. Debye; Spherically symmetric fourier transforms and medium range radial distribution functions in the x-ray determination of complex molecular structures, by D. P. Riley; Electron diffraction techniques for the study of amorphous systems, by S. H. Bauer; Structure of vitreous silica by total neutron scattering, by R. M. Delaney and A. H. Weber; High temperature x-ray diffraction methods applied to the study of non-crystalline media. Structure of molten fluorides and chlorides, by Jerzy Zarzycki; Electronic band structure of one-dimensional disordered arrays, by M. Lax and H. L. Frisch; X-ray absorption edge spectroscopy of compounds of chromium, manganese, and cobalt in crystalline and non-crystalline systems, by Robert A. Van Nordstrand; Magnetic resonance studies of glasses, by W. P. Slichter; The use and limitations of irreversible thermodynamics in the study of relaxation processes, by R. O. Davies; Liquid relaxation phenomena and the glass state, by Theodore A. Litovitz.

AD-611 840 Div. 14, 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVELOPMENT OF METHODS AND INVESTIGATION OF MECHANICAL PROPERTIES OF GRAPHITES AND CARBIDES AT TEMPERATURE OF UP TO 3200C,
by G. G. Konradi and M. A. Fedotov. 2 Mar 65,
14p FTD-TT-64-1035
TT 65-61792

Unclassified report

Unedited rough draft trans. of mono. Voprosy Vysokotemperaturnoi Prochnosti v Mashinostroenie, Kiev, 1962, p. 50-57.

Descriptors: (*Graphite, Mechanical properties), (*Carbides, Mechanical properties), (*Test methods, Heat resistant materials), High-temperature research,

Tensile properties, Compressive properties, Creep, Pyrolytic graphite, Niobium compounds, Zirconium compounds, Test methods, Dynamometers.

The developed methods allows a complex investigation of mechanical properties of materials in a temperature range from normal to 3200C. The obtained data offer the possibility of comparing properties of various materials and to make the necessary strength calculations. (Author)

AD-611 856 Div. 14, 25
CFSTI Prices: HC$1.00 MF$0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
SPECTROSCOPIC STUDIES OF THE VAPORIZATION OF REFRACTORY MATERIALS.
Quarterly rept. no. 3,
by Milton J. Linevsky. 1 Nov 63, 9p
Contract AF33 615 1150, Proj. 4776, ARPA Order 24, Task 6

Unclassified report

See also AD-609 121.

Descriptors: (*Refractory materials, Vaporization), (*Spectroscopy, Refractory materials), (*Vaporization, Refractory materials), Argon, Thorium compounds, Dioxides, Magnesium compounds, Fluorides, Aluminum compounds, Lithium compounds, Zirconium compounds, Nitrides, Infrared spectroscopy, Absorptum spectrum, Molecular spectroscopy.

Matrix isolation spectra in solid argon were obtained on 018 enriched Th02. From the resulting spectra it appears that the molecule is highly bent. Frequencies were assigned to the vsub1 and vsub3 vibrational fundamentals for all the various isotopic species. vsub2 was not observed in the frequency region (2 microns to 55.5 microns) covered and must be presumed to be less than 180/cm. Modifications of our spectroscopic equipment were made and it is now possible to obtain infrared spectra down to 180/cm. Examination of the long wavelength regions of the spectra of MgF2 and A1F3 using this modified equipment was made and additional spectra for lithium fluoride obtained. Resonance line studies were initiated on ZrN in a manner completely analogous to that used in the TiN study. However, much difficulty was encountered because of the reaction of the ZrN with carbon. Modifications of the furnace are being made to try to mitigate this reaction.

AD-611 858 Div. 14
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A METHOD OF PREPARING A FAST-SETTING CEMENT,
by L. M. Pozin, I. M. Al'shits, and N. M. Grad.
19 Feb 65, 5p FTD-TT-64-968
TT 65-61795

Unclassified report

Unedited rough draft trans. of Russian patent 157,749, appl. no. 752,843/23-4, 22 Nov 61.

Descriptors: (*Cements, Preparation), Polyester plastics, Zinc, Powder metals, Peroxides, Cobalt compounds, Weight, Hardness, Shock resistance.

A method is presented for preparing a fast setting cement on the basis of the polyester tar PN-1 which reduces the consumption of hardener. The polyester tar is mixed with zinc tar in the proportion by weight of 1 to 5.5. Peroxide is used as the hardener and naphthenate of cobalt as a accelerant.

AD-611 879 Div. 14, 4
CFSTI Prices: HC$2.00 MF$0.50

Olin Mathieson Chemical Corp., New Haven, Conn.
DEVELOPMENT OF A FIRE-RESISTANT WATER-BASE HYDRAULIC FLUID.
Bimonthly progress rept. no. 5, 1 Jan-28 Feb 65,
by E. H. Kober, H. F. Lederle, and G. F. Ottmann.
10 Mar 65, 27p
Contract NObs90268

Unclassified report

See also AD-609 952.

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), Amines, Phenols, Viscosity, Ignition, Crystallization, Sea water, Compatibility, Performance (Engineering), Flammability.

Two new base stocks were prepared by alkoxylation of N, N'-diphenyl p-phenylene diamine and p-anilinophenol. These, as well as the previously reported base stocks, required viscosity index improvers and pour point depressants in order to meet the 25F viscosity maximum of 850 cs and the pour point maximum of 0F. Four formulations having the best overall properties were selected for final formulation and evaluations. The reproducibility of base stock preparation was investigated and, with one exception, was found to be satisfactory. (Author)

AD-611 880 Div. 14, 25, 30
CFSTI Prices: HC$1.00 MF$0.50

New York State Coll. of Ceramics, Alfred Univ.
THE THERMAL-MECHANICAL BEHAVIOR OF STRONTIUM ZIRCONATE.
Bimonthly progress rept. no. 2, 1 Dec 64-1 Feb 65,
by J. E. Funk, J. Nemeth, and J. R. Tinklepaugh.
1 Feb 65, 15p
Contract NOw65 0131d

Unclassified report

See also AD-610 480.

Descriptors: (*Strontium compounds, Zirconates), (*Zirconates, Mechanical properties), (*Crystal structure, Zirconates), Thermal properties, Thermal stresses, X-ray diffraction analysis, Solid solutions, Laboratory furnaces, Refractory materials, Fracture (Mechanics), Symmetry (Crystallography), Sintering, Shock resistance, Binders, High-temperature research, Ceramic materials.

Progress was made in the construction of the new stress-strain apparatus for high temperature research. The furnace has been calibrated showing a temperature gradient of about 7C along a 2 inch bar. X-ray investigations of solid solutions to enhance yield and/or strength have continued. High temperature crystal symmetry studies of SrZrO3 indicate no transformation up to 1250C. (Author)

AD-612 049 Div. 14, 12
CFSTI Prices: HC$2.00 MF$0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
IMPACT STUDIES ON ABLATION-RESISTANT COMPOSITES,

by G. A. Schmidt, D. G. Flom, T. F. Geib, J. C. Fries, and F. A. Lucy. Feb 65, 42p Rept. no. R65SD3
Contract AF04 694 486

Unclassified report

Descriptors: (*Composite materials, Shock resistance), (*Impact shock, Composite materials), Epoxy plastics, Synthetic rubber, Foam rubber, Aluminum, Pyrolytic graphite, Silicone plastics, Pressure, Equations of state, Phenolic plastics, Shock waves, Ablation, Reentry vehicles.

The evaluation of composite configurations by the flying target technique is discussed. The critical impact pressure for epoxy-neoprane foam rubber-aluminum composite was found to be 2.6 kb. The critical impact pressure for pyrolytic graphite (surface nucleated)-neoprane foam rubber-aluminum composite was also found to be in the range of 2.6 kb. It was established that the substrates have a large influence on the critical impact pressure of the composites. (Author)

AD-612 064 Div. 14, 4
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
STABILIZATION OF SILICONE LUBRICATING FLUIDS AT 300 TO 400C BY SOLUBLE CERIUM COMPLEXES. Interim rept.,
by H. R. Baker, J. G. O'Rear, P. J. Sniegoski, and R. E. Kagarise. 8 Jan 65, 23p Rept. no. NRL-6156
Tasks RR007 08 44 5500, RR001 01 43 4752

Unclassified report

Descriptors: (*Siloxanes, Stabilization), (*Lubricant additives, Cerium compounds), (*Cerium compounds, Lubricant additives), (*Antioxidants, Lubricant additives), Complex compounds, Hydrides, Lubricants, Spectra (Infrared), Heat-resistant materials, Storage, Molecular properties.

The Si-H bond was shown to be involved in the formation of a stable cerium-silicone inhibitor system and this discovery was applied to the development of improved methods for stabilizing silicones. The inhibitory process uses initial reactions between hydrous cerous acetylacetonate and a polymethylhydrogen silicone. These reactions proceed and terminate in aerated refluxing benzene to provide a silicone-soluble adduct. The chemistry of the hydride group was followed quantitatively and some features of structure are postulated for the adduct. The simplified inhibitory process is a two-step reaction. Stabilization is completed by aerating a mixture of the cerium adduct and a silicone oil for one hour at 270 to 280C. There is an optimum concentration of cerium adduct for the stabilization of lightly phenylated dimethyl silicones. The same concentration achieves 100 to 500 percent improvements in the 300C stability of dimethyl silicones and their chlorophenyl- and phenyl-substituted types; with more highly phenyl-substituted silicones, stabilization temperatures are raised to 400C and relative improvement factors roughly parallel those observed at 300C. (Author)

AD-612 084 Div. 14, 4, 25
CFSTI Prices: HC$1.00 MF$0.50

Frick Chemical Lab., Princeton Univ., N. J.
THERMOELASTICITY AND CHAIN CONFIGURATION FOR RUBBER LIKE NETWORK POLYMERS,
by M. C. Shen and A. V. Tobolsky. Mar 65, 23p
ONR Technical rept. RLT-85
Contract Nonr185807, Proj. NR356 377

Unclassified report

Prepared in cooperation with North American Aviation Science Center, Thousand Oaks, Calif.

Descriptors: (*Elastomers, Thermoelasticity), (*Thermoelasticity, Elastomers), (*Polymers, Molecular isomerism), Rubber, Stresses, Thermodynamics, Acrylic resins.

The retractive force, F, in a stretched rubber network is mainly entropic in origin, but may also arise partially from an energetic contribution F sub e. The problem considered is how to relate the relative energetic contribution F sub e/F to stress-temperature measurements at constant length. An exact equation and several approximate equations are considered and applied to the experimental data. A new approximate relation is derived which differs somewhat from the one that is currently used. According to present theories of rubber elasticity, F sub e/F is related to the temperature dependence of the mean square end-to-end distance of the polymer chain in free space; or equivalently, to the energy difference between rotational isomers of the chain conformations, i.e., trans and gauche configurations. One of the basic tenets of these theories requires that the relative energetic contribution should be independent of elongation. New experimental evidence and data in the literature give a constant value of F sub e/F only in the approximate extension range $1.4 < \alpha < 3.0$. It is to be hoped that in this range thermoelastic measurements relate directly to the energetics of chain conformation, and that the assumption of the absence of intermolecular interaction remains essentially valid. (Author)

AD-612 085 Div. 14
CFSTI Prices: HC$1.00 MF$0.50

United States Polymeric Chemicals, Inc., Santa Ana, Calif.
DEVELOPMENT AND EVALUATION OF IMPROVED RESINS FOR FILAMENT WOUND PLASTICS. Quarterly rept. nos. 3 and 4, 31 May 64-31 Jan 65,
by T. F. Downey, J. A. Erikson, F. S. Thompson, and J. C. H. Chang. 31 Dec 64, 22p
Proj. 208LR107

Unclassified report

See also AD-605 307.

Descriptors: (*Filament wound construction, Binders), (*Plastics, Filament wound construction), Fibers, Glass textiles, Carbon, Impregnation, Mechanical properties, Aging (Materials), Epoxy plastics, Polyester plastics, Phenolic plastics, Heat-resistant plastics, Ablation, Tapes.

In the area of ablative applications, progress has been made in carbon roving impregnated with high heat resistant resin. Improvements by superior resin-fiber consolidation achives a tremendous increase in mechanical strength. Experiments with Sil-Temp cordage, as a candidate for ablative winding applications, have been conducted. Two preimpregnated unidirectional tapes have been successfully manufactured thus far. XFT-7067, an epoxy high strength tape, is designed to meet the requirements of Specification OS-10789 for the Polaris program, and XFT-5290, a high temperature phenolic type material, is being evaluated for Lance and other programs. A new process has been developed to impregnate polybenzimidazole resin using a solution coating method. This material is designed for high temperature resistance for prolonged periods. Other work described in this report includes evaluation of new epoxies such as ERLA-0400, new polyesters for preimpregnated roving, and 'S' glass roving with the new 903 finish.

AD-612 092 Div. 14, 4
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
SYNTHESIS, CHARACTERIZATION, AND ESTER-ESTER INTERCHANGE STUDY OF THE MIXED ESTER 2-ETHYLHEXYL BENZYL AZELATE.
Interim rept.,
by J. G. O'Rear and P. J. Sniegoski. 8 Jan 65, 14p
Rept. no. NRL-6149
Proj. RRMA03 021 652R001 07 01
Unclassified report

Descriptors: (*Low-temperature lubricants, Synthesis (Chemistry)), (*Esters, Chemical properties), Oils, Surface tension, Viscosity, Exchange reactions, Reaction kinetics, Disproportionation, Pyrolysis, Catalysis, Heat of activation, Instrument greases.

New components are in demand for low-temperature instrument oils. To meet this demand two new esters, bis(3,4-dichlorobenzyl) Beta-methyladipate and 2-ethylhexyl benzyl azelate, were synthesized and although both esters possessed the required high surface tensions (43.6 and 33.4 dynes/cm at 20C, respectively), only the azelate had a suitable viscosity for low-temperature application. This mixed ester, 2-ethylhexyl benzyl azelate, were prepared by the esterification of the half ester, 2-ethylhexyl hydrogen azelate, with a large excess of benzyl alcohol. A study was made of the disproportionation of 2-ethylhexyl benzyl azelate into two symmetrical diesters: 2(2-ethylhexyl benzyl azelate) reversibly yields dibenzyl azelate + bis(2-ethylhexyl) azelate. The reaction rates for this ester-ester interchange were found to be too small to restrict the desired application of the mixed ester at temperatures below 100C. (Author)

AD-612 134 Div. 14, 12
CFSTI Prices: HC$1.00 MF$0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
IMPROVED DIELECTRIC FILMS FOR OPTICAL AND SPACE APPLICATIONS,
by J. T. Cox, G. Hass, and J. B. Ramsey. 1963, 14p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64. Volume I, AD-611 432.

Descriptors: (*Dielectric films, Optical coatings), (*Optical coatings, Dielectric films), (*Solar cells, Coatings), (*Satellites (Artificial), Temperature), Silicon coatings, Refractory coatings, Silicon compounds, Monoxides, Dioxides, Oxides, Aluminum compounds, Thorium compounds, Zirconium compounds, Electron guns, Erosion, Ceramic coatings.

The designer of multilayer antireflection coatings, protected front surface mirrors, and filmed surfaces for space applications has often been seriously hampered by the fact that the number of oxides suitable for producing durable and optically transparent films with a great variety of refractive indices has been quite restricted. Many oxides, when evaporated from directly heated tungsten boats, become decomposed by reaction with the tungsten heater and condense on the substrates in the form of strongly absorbing films. New deposition techniques and treatments have greatly increased the number of oxides that can now be deposited in the form of optically non-absorbing coatings of Si2O3, SiO2, Al2O3, ThO2, and ZrO2. It is the purpose of this paper to present data on the preparation and optical properties of these oxide films and to discuss some of their applications, such as the preparation of well protected front surface mirrors with high reflectance in the ultraviolet, multilayer antireflection coatings, surface films for controlling the temperature of satellites, coatings for solar energy converters, and for the study of erosion effects in outer space.

AD-612 158 Div. 14, 4, 25
CFSTI Prices: HC$1.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa.
EVAPORATION OF ORGANIC COMPOUNDS FROM METAL SURFACES AT HIGH VACUUM,
by H. Gisser and S. Sadjian. 1962, 14p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y. 17-19 June 1964, Volume I, AD-611 432.

Descriptors: (*Lubricants, Evaporation), (*Organic compounds, Evaporation), (*Hydrocarbons, Evaporation), (*Space environmental conditions, Lubricants), Amines, Alcohols, Monomolecular films, Vacuum, Metals, Surfaces, Molecular association.

For the purpose of gathering additional information on the behavior of lubricants in space, a study was made of the removal of the last monolayer of non-polar hydrocarbon on metal surfaces, using coefficient of friction measurement as an indication of amount of material remaining. Work is reported involving the establishment of data on coefficient of friction of surfaces that are incompletely covered with friction reducing films, and relationship of pressure to friction of the monolayer remaining on metal surfaces.

AD-612 253 Div. 14, 26
CFSTI Prices: HC$2.00 MF$0.50

Honeywell Research Center, Hopkins, Minn.
MECHANICAL AND ELECTRICAL PROPERTIES OF TIC.
Interim Technical rept. no. 2,
by W. B. Harrison. Feb 65, 39p
Contract DA11 022ORD3441, Projs. 599 1007, TB2 0002
AROD 2884-2
Unclassified report

Descriptors: (*Ceramic materials, Carbides), (*Titanium compounds, Carbides), (*Carbides, Titanium compounds), Single crystals, Crystal structure, Chemical bonds, Impurities, Stresses, Hardness, Elasticity, Powder metallurgy, Porosity, Resistance (Electrical), Processing, Surfaces properties, Chemical polishing, Electrolytic polishing, Electrical properties.

The fabrication of three grades of TiC powders, with various impurities, into high-density, fine grained, polycrystalline ceramics was studied. Metallic iron in the original powder was found to promote grain growth. The mechanical behavior of each of these materials was studied as a function of porosity, grain size, and surface finish. Normal microstructural dependencies on the transverse strength of these materials were observed. Fracture in all these materials was predominantly intergranular except where the crack path encountered large TiC crystals in the polycrystalline mass and where surface damage caused a localized influence on the crack propagation. The electrical behavior of each material was examined and attempts were made to correlate this information with the crystallographic and electronic structure of TiC and in turn the mechanical behavior observed. (Author)

AD-612 283 Div. 14, 4, 8, 25
CFSTI Prices: HC$1.00 MF$0.50

RCA Labs., Radio Corp. of America, Princeton, N. J.
UTILIZATION OF ORGANIC MATERIALS FOR MOLECULAR ELECTRONICS.
Final rept. 1 Jun-30 Nov 64,
by Joel Goldmacher, Sol E. Harrison, George H. Heilmeier, and Ross Stander. Feb 65, 25p
Contract AF33 657 11662, Proj. 4460, Task 446002
AL TR-65-32

Unclassified report

Descriptors: (*Molecular electronics, Organic materials), (*Organic materials, Molecular electronics), (*Semiconducting films, Organic materials), (*Photoelectric materials, Organic materials), (*Modulators, Organic materials), Phthalocyanines, Copper compounds, Silver compounds, Cobalt compounds, Electric insulation, Polymers, Impurities, Aromatic compounds, Amines, Crystals, Transistors, Triodes, Diodes (Semiconductor), Integrated circuits.

In this study of prototype solid-state devices containing organic materials, and in the determination of the electronic properties of these organic compounds, four projects are reported: (I) Organic Thin-Film Devices; (II) Organics as Photoconductors; (III) Higher-Mobility Organic Semiconductors; (IV) Organic Molecular Crystals as Electro-Optic Modulators. Project I was an effort to obtain a thin-film transistor using the high-mobility organic semiconductor copper phthalocyanine. Studies of the production of good insulating films were performed. Project II carried the study of organic photoconductors to polymers doped with aromatic hydrocarbons. The doping of polymers appeared to have no effect on photoconduction. Project III concerned higher-charge-mobility compounds Ag(2+) phthalocyanine was found to be physically intractable. Cobalt phthalocyanine showed promise as a high-mobility material. Under Project IV, the electro-optic coefficient of hexamine was measured by means of optical second-harmonic generation. (Author)

15. Mathematics

AD-611 472 Div. 15

Michigan Univ., Ann Arbor.
BOUNDARY FUNCTIONS FOR FUNCTIONS DEFINED IN A DISK,
by F. Bagemihl and G. Piranian. 15 Apr 61, 9p
Contract AF49 638 633
AFOSR 594
Unclassified report

Pub. in Michigan Mathematical Journal (U. S.) v8 p201-07 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Functions, Disks), (*Disks, Functions), Complex variables, Boundary valve problems, Theorems.

AD-611 508 Div. 15

Miami Univ., Coral Gables, Fla.
HARMONIC INTERPOLATION IN FEJER POINTS WITH THE FABER POLYNOMIALS AS A BASIS,
by J. H. Curtiss. 24 May 64, 18p
Grant AF AFOSR62 189
AFOSR 65-0322
Unclassified report

Pub. in Mathematische Zeitschrift (Germany) v86 p75-92 1964 (Copies available only to DDC customers).

Descriptors: (*Polynomials, Boundary value problems), (*Boundary value problems, Polynomials), Potential theory, Numerical analysis, Functional analysis, Complex numbers, Topology.

AD-611 544 Div. 15, 26, 32
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif.
MARKOVIAN SEQUENTIAL REPLACEMENT PROCESSES,
by Howard M. Taylor. 3 Feb 65, 42p
Technical rept. no. TR-78
Contract Nonr22553; Grant NSF GP1625,
Proj. NR042 002
Unclassified report

Descriptors: (*Replacement theory, Operations research), (*Dynamic programming, Replacement theory), (*Statistical processes, Control), Sequential analysis, Decision theory, Costs, Management planning.

A sequential control process is a dynamic system which is observed periodically and classified into one of a number of possible states. After each observation one of a finite number of possible decisions is made. These decisions are the 'control;' they determine the chance laws of the system. A replacement process is a control process with an additional special action, called replacement, which instantaneously returns the system to some initial state. This report discusses replacement processes whose state space is a subset of a finite dimensional Euclidean space. The rule which minimizes the Total Expected Discounted Cost is known and is used to show the existence of a non-randomized stationary decision rule which minimizes the Average Cost per Unit Time. A relationship between the optimal rules under both criteria is given wherein the optimal average cost rule is the limit, in some sense, of a sequence of discounted cost rules which yields a functional equation characterizing the optimal average cost rule. Finally, some examples employing the theory are given. (Author)

AD-611 586 Div. 15, 25
CFSTI Prices: HC$2.00 MF$0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
ON THE USE OF VARIATIONAL PRINCIPLES FOR THE SOLUTION OF LINEAR INITIAL-VALUE PROBLEMS,
by Marshall J. Leitman and Morton E. Gurtin.
Dec 64, 37p Technical rept. no. TR-96
Contract Nonr56210, Proj. NR064 406
Unclassified report

Descriptors: (*Boundary value problems, Calculus of variations), (*Calculus of variations, Boundary value problems), (*Thermal conductivity, Boundary value problems), Numerical analysis, Functional analysis, Integral transforms.

The objective was to investigate the usefulness of variational principles in generating sequences of approximate solutions. The problems under investigation included one of heat conduction and one of wave propagation. The approximate results obtained are compared with well known exact solutions.

AD-611 637 Div. 15

California Univ., Los Angeles. Graduate School of Business Administration.
A CHARACTERIZATION OF THE EXPONENTIAL DISTRIBUTION.
Revised ed.,
by Thomas S. Ferguson. 15 Mar 64, 13p
Reprint no. WMSI-19
Contract Nonr23375, Proj. NR047 041
Unclassified report

Pub. in Annals of Mathematical Statistics (U. S.) v35 n3 p1199-207 Sep 1964 (Copies not available to DDC or Clearinghouse customers).
Revised edition of rept. dated 3 Apr 63.

Descriptors: (*Statistical distributions, Distribution theory), (*Distribution theory, Statistical distributions), Stochastic processes, Measure theory.

AD-611 707 Div. 15, 2

University Coll., London (England).
EXPANSION OF DAWSON'S FUNCTION IN A SERIES OF CHEBYSHEV POLYNOMIALS,
by David G. Hummer. 27 May 63, 3p
Unclassified report

Pub. in Mathematics of Computation (U. S.) v18 n86 p317-19 Apr 1964 (Copies not available to DDC or Clearinghouse customers). Research supported by U. S. Office of Naval Research.

Descriptors: (*Special functions (Mathematical), Series), (*Polynomials, Special functions (Mathematical)), Line spectrum, Absorption spectrum, Astrophysics.

AD-611 738 Div. 15, 12

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
SOLUTION OF VARIATIONAL PROBLEMS BY MEANS OF A GENERALIZED NEWTON-RAPHSON OPERATOR,
by Robert McGill and Paul Kenneth. 1 Jun 64, 6p
Contracts AF49 638 1207, NAS8 1549
AFOSR 65-0317
Unclassified report

Pub. in A I A A Journal (U. S.) v2 n10 p1761-6 Oct 1964 (Copies not available to DDC or Clearinghouse customers). Revision of rept. dated 17 Jan 64.

Descriptors: (*Calculus of variations, Boundary value problems), (*Boundary value problems, Calculus of variations), Optimization, Operators (Mathematics), Orbital trajectories, Numerical analysis.

This paper presents the development of an indirect method for solving variational problems by means of an algorithm for obtaining the solution to the associated nonlinear two-point boundary-value problem. The method departs from the usual indirect procedure of successively integrating the nonlinear equations and adjusting arbitrary initial conditions until the remaining boundary conditions are satisfied. Instead, an operator is introduced which produces a sequence of sets of functions that satisfy the boundary conditions but, in general, do not satisfy the nonlinear system formed by the state equations and the Euler-Lagrange equations. Under appropriate conditions, this sequence converges uniformly and rapidly (quadratically) to the solution of the nonlinear boundary-value problem. The computational effectiveness of the algorithm is demonstrated by three numerical examples. (Author)

AD-611 740 Div. 15

Miami Univ., Coral Gables, Fla.
ON THE CURTISS NONSINGULARITY CONDITION IN HARMONIC POLYNOMIAL INTERPOLATION,
by Andrew Sobczyk. 19 Aug 63, 17p
Contract AF49 638 1055; Grant AF AFOSR62 189
AFOSR 65-0316

Unclassified report

Pub. in Society for Industrial and Applied Mathematics. Journal (U. S.) v12 n3 p499-514 Sep 64 (Copies not available to DDC or Clearinghouse customers).
See also AD-268 335.

Descriptors: (*Harmonic analysis, Polynomials), (*Polynomials, Harmonic analysis), Functions, Conformal mapping, Complex variables, Matrix algebra, Determinants, Set theory, Mapping (Transformations).

AD-611 741 Div. 15

Syracuse Univ., N. Y.
ON A CLASS OF MEROMORPHIC FUNCTIONS WITH DIFICIENT ZEROS AND POLES,
by S. Hellerstein. 15 Jun 62, 11p
Contract AF49 638 571
AFOSR 4623

Unclassified report

Chap. 1 of Deficiencies of a Meromorphic Function and Distribution of Values in Angles and Annuli, Syracuse Univ., 1961.
Pub. in Pacific Journal of Mathematics (U. S.) v13 n1 p115-24 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Functions, Theorems), Real numbers, Number theory, Inequalities, Set theory.

AD-611 742 Div. 15, 1, 12

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
REAL-FREQUENCY STABILITY CRITERIA FOR LINEAR TIME-VARYING SYSTEMS,
by J. J. Bongiorno, Jr. 9 Apr 64, 13p
Grant AF AFOSR62 280
AFOSR 65-0323

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (U. S.) v52 n7 p832-41 Jul 64 (Copies not available to DDC or Clearinghouse customers). Revision of rept. dated 29 Sep 63.

Descriptors: (*Differential equations, Linear systems), (*Adaptive control systems, Differential equations), Stability, Matrix algebra, Tensor analysis, Fourier analysis, Satellite attitude, Guided missiles, Aircraft.

Bounds on the time-varying parameters that are sufficient to insure stability in linear time-varying systems are developed. The important and significant property of the stability criterion developed is that the bounds on the time-varying parameters can be established from the real-frequency characteristics of the time-invariant part of the system. Therefore, the stability criterion is applied easily in high-order systems. Techniques which permit the determination of decaying exponential bounds on the system signals are also presented. The application of the results obtained to parametric devices, satellite attitude control and adaptive systems is illustrated via examples. (Author)

AD-611 760 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Copenhagen Univ. (Denmark).
SUPPLEMENTARY AQL SINGLE SAMPLING INSPECTION PLANS,
by A. Hald. Feb 65, 11p Technical rept. no. TR-7
Contract N62558 3073, Proj. NR042 225

Unclassified report

Descriptors: (*Sampling, Quality control), Statistical distributions, Tables, Probability, Economics.

In a previous paper (AD-416 800) a set of AQL single sampling inspection plans was given for gamma = 2 and 10. Further research along the same lines led to a generalized model and corresponding tables as given in (AD-609 993). One of the new results is that values of gamma may normally be expected to be less than 2. For completeness this paper contains a set of AQL plans for gamma = 0.2 and 1.0 defined and computed as described in (AD-416 800). (Author)

AD-611 766 Div. 15, 16
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MATHEMATICAL EXPERIMENTATION IN TIME-LAG MODULATION,
by Richard Bellman, June Buell, and Robert Kalaba.
Feb 65, 17p Rept. no. RM-4432-NIH
Grant PHS GM09608 03

Unclassified report

See also AD-609 835, AD-606 987.

Descriptors: (*Time-lag theory, Modulation), (*Differential equations, Time-lag theory), Difference equations, Numerical methods and procedures, Harmonic analysis, Chemotherapy, Iterative methods, Mathematical models.

Equations of the form du/dt = g(u(t),u(h(t))) arise in a number of scientific contexts. In this paper, we point out some interesting properties of the solution of $u'(t) = -u(t-1-k\sin\omega t) + \sin at$. These properties were obtained by means of numerical solution. (Author)

AD-611 812 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
FREDHOLM OPERATORS AND THE ESSENTIAL SPECTRUM,
by Martin Schechter. Jan 65, 24p Rept. no. IMM-NYU-335
Contract DA31 124ARO D204, Proj. 20011501B704
AROD 247 64
Unclassified report

Descriptors: (*Operators (Mathematics), Functional analysis), (*Functional analysis, Operators (Mathematics), Invariance, Perturbation theory, Theorems, Topology.

Fredholm operators are defined and their basic properties are proved. The essential spectrum of an arbitrary closed operator is considered and its invariance under several kinds of perturbation is proved. (Author)

AD-611 844 Div. 15, 30, 32
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
PROGRAMMING UNDER UNCERTAINTY: AN EXPERIMENTAL CODE FOR THE COMPLETE PROBLEM,
by David Kohler and Roger Wets. Dec 64, 43p
Rept. no. D1-82-0391, Mathematical note no. 378
Unclassified report

Also available from the authors.
Prepared in cooperation with Operations Research Center, Univ. of Calif., Berkeley, Contract Nonr22283.

Descriptors: (*Linear programming, Probability), (*Programming (Computers), Linear programming), Operations research, Decision theory, Transportation, Inventory analysis, Optimization, Stochastic processes.

It is very convenient from a computational point of view to assume that the coefficients of a linear programming problem are exactly known. However, the resulting solution can differ widely from the true optimum because some or all of these coefficients may, in fact, be random variables. The 'complete' problem in programming under uncertainty takes into account the possibility of over- or under-estimating the requirements and penalizes the over- or under-supply. This paper describes the problem, presents two examples, outlines the mathematical aspects of an algorithm (given in AD-608 990) and finally gives the write-up and the features of an experimental code written for the IBM 7090 or 7094. (Author)

AD-611 909 Div. 15

Harvard Univ., Cambridge, Mass.
ON THE LOCATION OF THE ZEROS OF SOME INFRAPOLYNOMIALS WITH PRESCRIBED COEFFICIENTS,
by J. L. Walsh and O. Shisha. 2 May 63, 8p
Contract AF49 638 574
AFOSR 65-0350
Unclassified report

Pub. in Pacific Journal of Mathematics (U. S.) v14 n3 p1103-9 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Polynomials, Number theory), Sequences, Real numbers, Complex numbers, Functions.

This note contributes more deeply to the study of zeros of infrapolynomials with prescribed coefficients by making use of some properties of polynomials and rational functions.

AD-611 914 Div. 15

Syracuse Univ., N. Y.
THE DEFICIENCIES OF MEROMORPHIC FUNCTIONS OF FINITE LOWER ORDER,
by Albert Edrei. 14 Nov 62, 22p
Contract AF49 638 571
AFOSR 65-0349
Unclassified report

Pub. in Duke Mathematical Journal (U. S.) v31 n1 p1-22 Mar 1964 (Copies not available to DDC or Clearinghouse customers). See also AD-611 741.

Descriptors: (*Functions, Complex variables), (*Complex variables, Functions), Theory.

AD-611 917 Div. 15

Columbia Univ., New York.
SUFFICIENT STATISTICS IN THE CASE OF INDEPENDENT RANDOM VARIABLES,
by L. Brown. 30 Dec 63, 20p
Contract Nonr26604, Proj. NR047 005
Unclassified report

Pub. in Annals of Mathematical Statistics (U. S.) v35 n4 p1456-74 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stochastic processes, Real variables), (*Real variables, Stochastic processes), Measure theory, Topology, Theorems.

AD-611 918 Div. 15

Columbia Univ., New York.
MINIMAX CHARACTER OF THE R SQUARE-TEST IN THE SIMPLEST CASE,
by N. Giri and J. Kiefer. 14 Jan 64, 17p
Contracts Nonr26604, Nonr40103, Proj. NR047 005
Unclassified report

Pub. in Annals of Mathematical Statistics (U. S.) v35 n4 p1475-90 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Statistical tests, Game theory), (*Game theory, Statistical tests), Decision theory, Transcendental functions, Transformations (Mathematics), Matrix algebra, Power series.

In the first nontrivial case, dimension p = 3 and sample size N = 3 or 4 (depending on whether or not the mean is known), it is proved that the classical level alpha normal test of independence of the first component from the others, based on the squared sample multiple correlation coefficient R squared, maximizes, among all level alpha tests, the minimum power on each of the usual contours where the R square-test has constant power. A corollary is that the R square-test is most stringent of level alpha in this case. (Author)

AD-611 919 Div. 15

Syracuse Univ., N. Y.
ENTROPY AND ITS APPLICATIONS,
by G. G. Lorentz. 4 Nov 63, 8p

Grant AF AFOSR424 63
AFOSR 65-0332

Unclassified report

Pub. in Society for Industrial and Applied Mathematics. Journal. Series B: Numerical Analysis (U. S.). (Copies not available to DDC or Clearinghouse customers).
See also AD-265 349.

Descriptors: (*Functions, Set theory), (*Functional analysis, Set theory), Topology.

AD-611 920 Div. 15

Syracuse Univ., N. Y.
SUMMATION OF SEQUENCES AND SUMMATION OF SERIES,
by G. G. Lorentz and K. Zeller. 20 Apr 63, 5p
Gant AF AFOSR62 138
AFOSR 65-0321

Unclassified report

Pub. in American Mathematical Society. Proceedings (U. S.) v15 n5 -743-6 Oct 1964 (Copies not available to DDC or Clearinghouse customers). Research done in cooperation with Tubingen Univ. (Germany).

Descriptors: (*Sequences, Series), (*Series, Sequences), (*Matrix algebra, Sequences), Transformations (Mathematics), Taylor's series.

In this paper it is shown that there exist regular sequence summation methods for which the summability field is not contained in the summability field of any regular series summation method. On the other hand there are regular series methods for which the summability field is not contained in the summability field of any regular sequence summation method.

AD-611 931 Div. 15, 8

North Carolina Univ., Chapel Hill.
ON A BOUND USEFUL IN THE THEORY OF FACTORIAL DESIGNS AND ERROR CORRECTING CODES,
by R. C. Bose and J. N. Srivastava. 27 May 63, 8p
Grant AF AFOSR84 63
AFOSR 4833

Unclassified report

Pub. in Annals of Mathematical Statistics (U. S.) v35 n1 p408-14 Mar 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Combinatorial analysis, Projective geometry), (*Coding, Projective geometry), Set theory, Groups (Mathematics), Prime numbers, Communication theory.

AD-611 932 Div. 15, 30

Research Triangle Inst., Durham, N. C.
THE CONDITIONAL DISTRIBUTION OF SETS OF TESTS ON A SYSTEM SIMULATED FROM TESTS ON ITS COMPONENTS,
by W. S. Connor. 15 Dec 62, 5p
Reprint Series no. S-29
Grant AF AFOSR62 309
AFOSR 3238

Unclassified report

Pub. in Annals of Mathematical Statistics (U. S.) v34 n4 p1585-7 Dec 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Statistical distribution, Tests), (*Tests, Simulation), Mathematical models, Probability, Reliability, Systems engineering, Statistical analysis.

AD-611 940 Div. 15

Southern Methodist Univ., Dallas, Tex.
ON THE ANALYSIS OF GROUP DIVISIBLE DESIGNS,
by C. H. Kapadia and D. L. Weeks. 1964, 3p
AROD 2773-9

Unclassified report

Pub. in American Statistical Association. Journal (U. S.) v59 p1217-9 Dec 1964 (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with Oklahoma State Univ., Stillwater.

Descriptors: (*Combinatorial analysis, Groups (Mathematics)), (*Groups (Mathematics), Combinatorial analysis), Analysis of variance.

This note gives an alternate formula for computing the adjusted treatment sum of squares for Group Divisible Partially Balanced Incomplete Block Designs. The proposed formula is shown to be equal to one which is given in a previous work and hence a check is provided in carrying out the computations. (Author)

AD-611 941 Div. 15

Lund Univ., (Sweden).
A UNIFIED DERIVATION OF SOME NON-PARAMETRIC DISTRIBUTIONS,
by Carl-Erik Sarndal. 1964, 13p
AROD 2776-15

Unclassified report

Pub. in American Statistical Association. Journal (U.S.) v59p 1042-53 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Statistical distributions, Population (Mathematics)), Sampling, Probability, Theory, Mathematical models.

This paper presents a unified derivation of a number of parameter-free distributions, some of which have appeared earlier in the literature. The starting point is the information provided by a random sample drawn from a certain population and the frequencies observed in a number of mutually exclusive classes. Several types of populations and several ways of defining the classes are considered. The distributions derived concern the unknown class frequencies and the unknown cumulative class frequencies in the population, or in a second independent sample. (Author)

AD-611 949 Div. 15

Harvard Univ., Cambridge, Mass.
SOME APPLICATIONS OF THE THEORY OF BLOCKS OF CHARACTERS OF FINITE GROUPS,
by Richard Brauer. 20 Jan 64, 16p
Contract AF49 638 287
AFOSR 65-0347

Unclassified report

Pub. in Journal of Algebra (U.S.) v1 n2 p152-67 Jul 1964 (Copies available only to DDC users).

Descriptors: (*Groups (Mathematics), Combinatorial analysis), (*Combinatorial analysis, Groups (Mathematics)), Algebra, Prime numbers, Set theory, Transformations (Mathematics).

AD-611 950 Div. 15

Yale Univ., New Haven, Conn.
GREEN'S TRANSFORMS AND SINGULAR BOUNDARY VALUE PROBLEMS,
by Einar Hille. 1963, 13p
Contract AF49 638 224
AFOSR 65-0346

Unclassified report

Pub. in Journal de Mathematiques Pures et Appliquees (France) v42 n9 p331-42 1963 (Copies available only to DDC users).

Descriptors: (*Transformations (Mathematics), Boundary value problems), (*Boundary value problems, Transformations (Mathematics)), (*Identities, Boundary value problems), Differential equations, Theory, Complex variables, Integration, Functions.

A class of identities was introduced in the theory of linear second order differential equations for which the name of Green's transforms was proposed. Such a transform serves to delimit in the complex plane the regions where a given solution can have zeros. But the transform can be used for other purposes than to obtain zero free regions. It was used to study integrability and growth properties of solutions. In the present paper the same technique is utilized in a study of the singular boundary problem of Hermann Weyl.

AD-611 962 Div. 15, 25

North Carolina State Coll., Raleigh.
A NOTE ON PERIODIC SOLUTIONS OF THE DUFFING EQUATION,
by Raimond A. Struble. 1964, 4p
AROD 4105-4

Unclassified report

Pub. in Journal of Mathematical Analysis and Applications (U. S.) v9 n3 p498-501 Dec 1964 (Copies available to DDC users).

Descriptors: (*Non-linear differential equation, Theory), Harmonic analysis, Perturbation theory, Oscillation, Trajectories.

AD-611 993 Div. 15

California Univ., Riverside.
INTEGRAL INEQUALITIES FOR FUNCTIONS WITH NON-DECREASING INCREMENTS,
by H. D. Brunk. 29 Nov 63, 12p
Grant AF AFOSR62 139
AFOSR 65-0341

Unclassified report

Pub. in Pacific Journal of Mathematics (U. S.) v14 n3 p783-93 1964 (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with Missouri Univ., Columbia.

Descriptors: (*Inequalities, Functions), (*Functions, Inequalities), (*Integrals, Inequalities), Mapping (Transformations), Theory.

AD-611 998 Div. 15

Duke Univ., Durham, N. C.
COMPLETELY MONOTONE SEQUENCES AS INVARIANT MEASURES,
by Richard Scoville. 15 Apr 63, 14p
Grant AF AFOSR61 51
AFOSR 65-0320

Unclassified report

Pub. in American Mathematical Society. Transactions (U. S.) v112 n2 p318-29 Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sequences, Measure theory), (*Measure theory, Sequences), Transformations (Mathematics), Invariance, Probability, Real numbers.

AD-612 035 Div. 15
CFSTI Prices: HC$6.00 MF$1.25

Iowa State Univ., of Science and Tech., Ames.
RESEARCH ON ANALYSIS OF VARIANCE AND RELATED TOPICS.
Final technical rept.,
by G. Zyskind, O. Kempthorne, R. F. White, E. E. Dayhoff, and T. E. Doerfler. Nov 64, 229p
Contract AF33 616 8269, Proj. 7071, Task 707101
ARL 64-193

Unclassified report

Descriptors: (*Analysis of variance, Experimental data), Model theory, Combinatorial analysis, Stochastic processes, Sampling, Population (Mathematics), Statistical tests.

The research described in this report is directed towards understanding of linear models and the analysis of variance with regard to experimentation. Chapter I gives a general outline of topics covered in the report. Chapter II gives a detailed account of the randomization consequences in a generalization of the balanced incomplete block design. Chapter III attempts a unified formulation of experimental structures and discusses variance analysis in the general experiment. Chapter IV introduces generalized polykays and discusses their application to the obtaining of variances and covariances of components of variation. Chapter V discusses and relates various topics in linear models. Chapter VI discusses the size and power of certain tests under experimental randomization.

AD-612 065 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

Saint Louis Univ., Mo.
ON A SUFFICIENT CONDITION FOR ABSOLUTE CONTINUITY.
Master's thesis,
by Martin David Fraser. 1965, 45p
Contract AF33 608 1115

Unclassified report

Descriptors: (*Real variables, Functional analysis), (*Functional analysis, Real variables), Functions, Integration, Measure theory.

The formulation of a condition which yields absolute continuity when combined with continuity and bounded variation is the problem considered in the paper. The formal statement of this condition, called interchangeable additivity of the second kind, as a definition is the purpose of the paper. Briefly, the formulation is achieved through a discussion which develops a proof by contradiction of a sufficiently theorem for absolute continuity which uses in its hypothesis the condition of continuity and bounded variation.

AD-612 117 Div. 15
CFSTI Prices: HC$3.00 MF$0.75

Texas Technological Coll., Lubbock. School of Engineering.
AN APPROXIMATION OF THE CUMULATIVE BINOMIAL PROBABILITY DISTRIBUTION.
Master's Thesis,
by Jack M. Hamilton. May 64, 74p
Contract AF33 608 1119

Unclassified report

Descriptors: (*Probability, Distribution theory), (*Distribution theory, Probability), (*Binomials, Distribution theorgy), Sampling, Power series, Digital computers, Programming (Computers).

The cumulative binomial distribution B(x;n,p) is the probability of x or less successes in n trials with p the probability of success in a single trial. There is no practical and concise procedure for calculating the B(x;n,p) for large values of n. There is no brief tabular presentation of the B(x;n,p) as there is for the cumulative Poisson and normal distributions. The cumulative binomial distribution is operationally defined, and the currently used approximations to it are discussed. An asymptotic expansion of the distribution of a sample sum is used to produce an approximation of the cumulative binomial probability distribution with the desired accuracy of three decimal places.

AD-612 186 Div. 15, 26
CFSTI Prices: HC$1.00 MF$0.50

Northwestern Univ., Evanston, Ill. Technological Inst.
ON REPRESENTATIONS OF SEMI-INFINITE PROGRAMS WHICH HAVE NO DUALITY GAPS.
Revised ed.,
by A. Charnes, W. W. Cooper, and K. Kortanek.
Aug 1964, 18p Rept. no. ONR-RM-96
Contracts Nonr122810, Nonr76001, Projs. 047 021, NR047 011

Unclassified report

Prepared in cooperation with Carnegie Inst. of Tech., Pittsburgh.
Revision of rept. dated Apr 64.
See also AD-274 258.

Descriptors: (*Linear programming, Inequalities), (*Inequalities, Linear programming), Convex sets, Optimization, Algebra, Topology, Sequences, Management planning.

Duality gaps which may occur in semi-infinite programs are shown to be interpretable as a phenomenon of an improper representation of the constraint set. Thus, any semi-infinite system of linear inequalities has a canonically closed equivalent (with interior points) which has no duality gap. With respect to the original system of inequalities, duality gaps may be closed by adjoining additional linear inequalities to the original system. Also, for consistent, but not necessarily canonically closed programs, a partial regularization of original data removes duality gaps that may occur. In contrast, a new 'weakly consistent' duality theorem without duality gap may have a value determined' by an inequality which is strictly redundant with respect to the constraint set defined by the total inequality system. (Author)

AD-612 206 Div. 15, 30

Research Triangle Inst., Durham, N. C.
ON THE PROBABILITY OF WINNING WITH DIFFERENT TOURNAMENT PROCEDURES,
by Donald T. Searls. 1963, 21p
Reprint Series no. S-28
Grant AF AFOSR62 309
AFOSR 65-0342

Unclassified report

Pub. in American Statistical Association (U. S.) v58 p1064-81 Dec 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Game theory, Probability), (*Probability, Game theory), Optimization, Scheduling, Numerical analysis.

Paired comparisons among competing items are analogous to games between contestants and the process of determining the winning item among t contestants is analogous to a tournament. Four different types of tournaments are investigated for the eight-player case. Expressions are developed for (1) the probability that each player wins and (2) the expected number of games required. Examples are presented for comparison of tournament types and to study the effects of (a) the initial draw, (b) mis-classification when using a priori information in initial pairing, and (c) 'byes.' Some generalizations in terms of number of players and replication are developed. (Author)

AD-612 222 Div. 15

Massachusetts Inst. of Tech., Cambridge.
BEST APPROXIMATION WITH RESPECT TO NEARBY NORMS,
by Bernard R. Kripke. 4 Oct 63, 3p
Grant AF AFOSR62 348
AFOSR 65-0324

Unclassified report

Pub. in Numerische Mathematik (West Germany) v6 p103-5 1964 (Copies available only to DDC users).

Descriptors: (*Numerical analysis, Matrix algebra), (*Matrix algebra, Numerical analysis), Sequences, Polynomials, Integration, West Germany.

AD-612 223 Div. 15

Technion - Israel Inst. of Tech., Haifa.
ON COVERING OF BALANCED INCOMPLETE BLOCK DESIGNS,
by Haim Hanani. 13 May 63, 12p
Grant AF EOAR63 60
AFOSR 65-0356

Unclassified report

Pub. in Canadian Journal of Mathematics v16 p615-25 1964 (Copies available only to DDC users).

Descriptors: (*Set theory, Combinatorial analysis), (*Combinatorial analysis, Set theory), Groups (Mathematics), Israel.

AD-612 231 Div. 15

North Carolina Univ., Chapel Hill.
MATHEMATICAL THEORY OF FACTORIAL DESIGNS. PART I. ANALYSIS, PART II. CONSTRUCTION,
by R. C. Bose and J. N. Srivastava. 1963, 16p
Grant AF AFOSR84 63
AFOSR 4834

Unclassified report

Pub. in Bulletin of the I.S.I., 34th session, Ottawa, p780-94 1963. See also AD-260 716.

Descriptors: (*Combinatorial analysis, Theory), Vector analysis, Matrix algebra, Statistical analysis, Algebra.

A summary is presented of recent work done by the authors in the methods of analysis of factorial designs, including both fractional replications and confounded designs. The general methods of analysis described herein not only facilitate the analysis in individual cases, but also they throw light on possible methods of constructing designs with various desirable properties.

AD-612 236 Div. 15

Massachusetts Inst. of Tech., Cambridge.
SECTIONAL CURVATURES AND CHARACTERISTIC CLASSES,
by John A. Thorpe. 21 Oct 63, 18p
Contracts AF49 638 42, Nonr26657
AFOSR 65-0345

Unclassified report

Pub. in Annals of Mathematics (U. S.) v80 n3 p429-43 Nov 1964 (Copies available only to DDC users).

Descriptors: (*Curved profiles, Topology), (*Topology, Curved profiles), (*Partial differential equations, Curved profiles), Algebraic topology, Geometry.

AD-612 240 Div. 15

North Carolina Univ., Chapel Hill.
COMBINATORIAL PROPERTIES OF PARTIALLY BALANCED DESIGNS AND ASSOCIATION SCHEMES,
by R. C. Bose. Mar 63, 30p
Grant AF AFOSR84 63
AFOSR 4835

Unclassified report

Pub. in Sankhya: Indian Journal of Statistics. Series A. Methods and Techniques (India) v25 pt2 p109-36 Jul 1963 (Copies available only to DDC users).

Descriptors: (*Combinatorial analysis, Theory), Algebra, Matrix algebra, Set theory.

AD-612 251 Div. 15
CFSTI Prices: HC$3.00 MF$0.50

Oklahoma Univ., Norman.
THE DEVELOPMENT AND ANALYSIS OF A TWO STATION SEQUENTIAL QUEUING SYSTEM.
Master's thesis,
by Joseph Adamo. 1965, 51p
Contract AF33 608 1096

Unclassified report

Descriptors: (*Queuing theory, Operations research), (*Operation research, Queuing theory), Sequential analysis, Combinatorial analysis.

The work is concerned first with development and analysis of a two station sequential system with no queue allowed. Then , systems with no queue before first station maximum of one, two, and three units respectively between stations are considered.

AD-612 267 Div. 15
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ALGEBRAIC TECHNIQUES AND THE MECHANIZATION OF NUMBER THEORY,
by Stephen A. Cook. Mar 65, 38p
Rept. no. RM-4319-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Number theory, Mathematical logic), (*Mathematical logic, Algebra), (*Algebra, Computer logic), Theorems, Computers, Metamathematics, Pattern recognition.

A number of mechanical procedures for generating proofs of theorems of logic have appeared in the literature, all based on the Skolem-Herbrand theorem. Although in principle the procedures can be applied to find proofs of mathematical theorems, the procedures are very inefficient for this purpose because they are designed to operate on too large a domain. This report outlines a general method by which these procedures can be adapted to operate more efficiently on a much more restricted domain: the statements of elementary number theory. The method is given a theoretical justification, and several specific algorithms are described for realizing the general method. These algorithms are applied to examples. Much more detailed study must be done before the method can be successfully utilized by a computer to generate proofs of difficult number-theoretic theorems. (Author)

AD-612 281 Div. 15
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
SPECTRAL ANALYSIS OF TIME SERIES GENERATED BY SIMULATION MODELS,
by George S. Fishman and Philip J. Kiviat. Feb 65, 79p Rept. no. RM-4393-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Series, Mathematical models), (*Mathematical models, Stochastic processes), Statistical analysis, Queueing theory, Time, Operations research, Simulation.

This study applies spectral analysis to the study of time series generated by simulated stochastic models. As these data are autocorrelated, analysis by methods applicable to independent observations is precluded. Mathematical models known as covariance stationary stochastic processes are useful representations of autocorrelated time series. The increased publication of literature describing stochastic processes and spectral analysis, in particular, is making these ideas available to an increasing audience. Section I presents a rationale for our interest in time series models and spectral analysis. Section II describes the basic notions of covariance stationary processes. It emphasizes the equivalence of looking at these processes in both the time and frequency domains; the compactness of frequency domain analysis seemingly recommends it over correlation analysis. Section III provides a heuristic background for understanding statistical spectral analysis. Simple frequency-domain statistical properties are emphasized and compared with the rather involved sampling properties of estimated correlograms. Several relevant statistical tests are described. Three simulated experiments are used as examples of how to apply spectral analysis. These are described in Sec. IV.

AD-612 312 Div. 15

Iowa State Univ., Iowa City.
PRINCIPAL SOLUTIONS OF NONOSCILLATORY LINEAR DIFFERENTIAL SYSTEMS,
by William T. Reid. 1963, 27p
Grant AF AFOSR438 63
AFOSR 65-0344

Unclassified report

Pub. in Journal of Mathematical Analysis and Applications (U.S.) v9 n3 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Differential equations, Matrix algebra), (*Matrix algebra, Differential equations), Functional analysis, Complex numbers.

AD-612 357 Div. 15, 26
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Los Angeles. Graduate School of Business Administration.
GEOMETRIC DISTRIBUTION IN SOME TWO DIMENSIONAL QUEUING SYSTEMS.
Management Sciences Research Project,
by Richard V. Evans. Jan 65, 28p
Rept. nos. WP-64, RR-93
Contract Nonr23373, Proj. 047 003
Unclassified report

Prepared in cooperation with Western Management Science Institute.

Descriptors: (*Queuing theory, Distribution theory), (*Geometry, Queuing theory), Stochastic processes, Operations research, Management planning, Iterative methods.

The state of the system is a two dimensional random variable. All transition events have negative exponential time distributions with positive means. For any pair of states (n, i) and (n, j) there is at least one possible sequence of transitions from one to the other such that in all states visited N sub 1 equals n.

AD-612 379 Div. 15, 12, 26
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
USE OF GENERALIZED ACTIVITY NETWORKS IN SCHEDULING,
by S. M. Drezner and A. A. B. Pritsker. Jan 65, 12p Rept. no. P-3040
Unclassified report

Descriptors: (*Scheduling, Operations research), (*Operations research, Scheduling), Management planning, Networks, Checkout procedures, Feedback, Probability, Algebra, Topology.

The 'Generalized Activity Network' model is a technique which possesses all the communication benefits associated with the PERT type networks yet permits the analysis of more complex logical relationships and feedback loops. It is an analytical tool which, when used in conjunction with a technique which estimates activity times, appears to yield a feasible method for short-range evaluations of a given resource configuration. In those cases where resource availability is not an active constraint the network approach provides a mechanism for evaluating alternative schedules.

AD-612 381 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE PRODUCT FORM OF THE SIMPLEX METHOD,
by Philip Wolfe. Mar 65, 13p Rept. no. P-3075
Unclassified report

Descriptors: (*Linear programming, Matrix algebra), (*Matrix algebra, Linear programming), Transformations (Mathematics), Operations research.

This paper describes algebraically the product form of the simplex method for linear programming, and points out some of its advantages. The material is drawn from several previous publications (AD-114 138, AD-403 418). (Author)

AD-612 430 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
STILL ANOTHER METHOD FOR PRODUCING NORMAL VARIABLES IN A COMPUTER,
by George Marsaglia. Jan 65, 8p
Mathematical note no. MN-346, rept. no. D1-82-0345
Unclassified report

Also available from the author.

Descriptors: (*Programming (Computers), Numbers), (*Numbers, Probability), Real variables, Production.

A method for producing normal random variables in terms of uniform random variables U sub 1, U sub 2, U sub 3,.... If Y = U sub 1 + U sub 2 + U sub 3, then choosing one of the four random variables 2Y - 3, (4Y - 6)/3, (Y - 7)/2 or (Y + 4)/2 in the proportions .8365, .11506, .00372 and .00372 will produce the required normal variate 98.6 per cent of the time. The other 1.4 per cent is devoted to the tail or a rejection technique in order that the composite be exact. The method leads to very fast computer programs which are easy to code and occupy little space in the computer. (Author)

AD-612 435 Div. 15

Institute for Fluid Dynamics and Applied Mathematics, Maryland Univ., College Park.
APPROXIMATION OF DERIVATIVES BY FINITE DIFFERENCE METHODS IN ELLIPTIC BOUNDARY VALUE PROBLEMS,
by J. H. Bramble and B. E. Hubbard. 8 Nov 63, 13p
Grants AF AFOSR62 454, NSF GP3
AFOSR 65-0327
Unclassified report

Pub. in Contributions to Differential Equations (U. S.) v3 n4 p399-410 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Boundary value problems, Partial differential equations), (*Difference equations, Boundary value problems), (*Numerical analysis, Boundary value problems), Green's function.

AD-612 436 Div. 15

Hamline Univ., St. Paul, Minn.
ON GAUSSIAN MEASURES EQUIVALENT TO WIENER MEASURE,
by D. E. Varberg. 25 Jun 63, 14p
Grant AF AFOSR35 63
AFOSR 65-0343
Unclassified report

Pub. in American Mathematical Society. Transactions (U. S.) v113 n2 p262-73 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Measure theory, Statistical processes), (*Statistical processes, Measure theory), Stochastic processes, Transformations (Mathematics), Probability, Statistical functions.

The question of when two Gaussian measures are equivalent is investigated for the case where one of the measures is Wiener measure. Necessary and sufficient conditions are given for such an equivalence. An explicit formula is given for the Radon-Nikodym derivative of one measure with respect to the other. While examining the representation of a Gaussian process by means of a linear transformation of the Wiener process, a new class of Gaussian processes, factorable covariance functions, is studied.

16. Medical Sciences

AD-611 467 Div. 16

Pisa Univ. (Italy).
MODIFICATIONS IN THE EVOKED POTENTIALS PRODUCED BY REPETITIVE PHOTIC STIMULATION OBSERVED IN THE Mediopontine Pretrigeminal CAT (Modificazione dei Potenziali Evocati dalla Stimolazione Fotica Ripetitiva nella Corteccia Visiva e nel Corpo Genicolato Laterale del Gatto Mediopontino Pretrigeminale),
by M. Mancia, M. Meulders, and G. Santibanez-H.
1959, 2p
Contract AF61 052 107
AFOSR TN-60-1281

Unclassified report

Pub. in Societa Italiana di Biologia Sperimentale. Bollettino, v35 n24 p1939-40 1959 (Copies available only to DDC users).
Document in Italian.

Descriptors: (*Photosensitivity (Biological), Adaptation (Physiology)), Nervous system, Stimulation, Light, Electroencephalography, Cats, Italy.

AD-611 469 Div. 16

Pisa Univ. (Italy).
ACTIVITY IN THE OPTIC NERVE AND IN THE LATERAL GENICULATE IN THE DARK AND DURING CONTINUOUS ILLUMINATION (Attivita nel Nervo Ottice e nel Genicolato Laterale nell'Oscurita e durante l'Illuminazione Continua),
by A. Arduini and L. Pinneo. 6 Mar 61, 3p
Contract AF61 052 107
AFOSR 1248

Unclassified report

Pub. in Societa Italiana de Biologia Sperimentale. Bollettino, v37 n9 p430-32 1961 (Copies available only to DDC users).
Document in Italian.

Descriptors: (*Optic nerve, Stimulation), (*Photosensitivity (Biological), Optic nerve), Adaptation (Physiology), Light, Electroencephalography, Italy.

AD-611 470 Div. 16

Karolinska Inst., Stockholm (Sweden).
ADRENALINE EXCRETION DURING RESTING CONDITIONS AND AFTER INSULIN IN ADRENALECTOMIZED HUMAN SUBJECTS,
by U. S. von Euler, D. Ikkos and R. Luft. 3 Jun 61, 8p
Contract AF61 052 309
AFOSR 2088

Unclassified report

Pub. in Acta Endocrinologica (Denmark). v38 p441-48 1961 (Copies available only to DDC users).

Descriptors: (*Epinephrine, Excretion), Insulin, Urine, Corticosteroid agents, Blood, Glucose, Chemoreceptors, Pathology, Sweden.

The effect of insulin on the urinary excretion of adrenaline was studied in 10 bilaterally adrenalectomized patients receiving cortisone and in eight healthy volunteers. The resting excretion of adrenaline was the same in both groups. Insulin administration to the adrenalectomized patients led to an increase in adrenaline excretion from the control level (mean ± S. E.) of 2.42 ± 0.33 to 5.01 ± 0.98 ng per min ($P < 0.02$) during the second hour, and 6.61 ± 0.82 ng per min ($P < 0.001$) during the third hour. In the normal subjects the maximum adrenaline excretion (21.7 ± 3.49 ng per min) was observed during the first hour. The response of the blood glucose level to insulin was the same in both groups. It is concluded that extra-adrenal chromaffin cells produce adrenaline and respond to insulin. It is suggested that hypoglycaemia may not be the principal cause of this response. (Author)

AD-611 471 Div. 16

Pisa Univ. (Italy).
NEUROPHYSIOLOGICAL STUDY OF AN EMOTIVE REACTION IN THE CHAFFINCH (Studio Neurofisiologico d'una Reazione Emotiva nel Fringuello (Fringilla Coelebs)),
by P. Strata. 24 Mar 60, 2p
Contract AF61 052 107
AFOSR TN-60-1278

Unclassified report

Pub. in Societa Italiana di Biologia Sperimentale. Bollettino, v36 n13 p629-30 1960 (Copies available only to DDC users).
Document in Italian.

Descriptors: (*Birds, Adaptation (Physiology)), Nervous system, Physiology, Drugs, Italy.

AD-611 473 Div. 16

Pisa Univ. (Italy).
MODIFICATIONS IN THE EVOKED POTENTIALS PRODUCED BY REPETITIVE PHOTIC STIMULATION OBSERVED IN THE VISUAL CORTEX AND IN THE LATERAL GENICULATE BODY IN THE 'CERBEAU ISOLE' CAT (Modificazione dei Potenziali Evocati Dalla Stimolazione Fotica Ripetitiva Nella Corteccia Visiva e nel Corpo Genicolato Laterale del Gatto Cerveau Isole),
by M. Mancia, M. Meulders, and e G. Santibanez-H.
1959, 2p
Contract AF61 052 107
AFOSR TN-60-1280

Unclassified report

Pub. in Societa Italiana di Biologia Sperimentale. Bollettino. v35 n24 1959 (Copies available only to DDC users).
Document in Italian.

Descriptors: (*Photosensitivity (Biological), Adaptation (Physiology)), Nervous system, Vision, Cerebral cortex, Light, Stimulation, Electroencephalography, Cats, Italy.

AD-611 474 Div. 16

Pisa Univ. (Italy).
RETINAL DEAFFERENTATION AND THE 'CHANG' EFFECT (Deafferentazione Retinica ed Effetto Chang),
by A. Arduini and e. T. Hirao. 1959, 2p
Contract AF61 052 107
AFOSR TN-60-1284

Unclassified report

Pub. in Scieta Italiana di Biologia Sperimentale. Bollettino. v35 n24 1959 (Copies available only to DDC users).
Document in Italian.

Descriptors: (*Retina, Stimulation), Adaptation (Physiology), Vision, Drugs, Nervous system, Physiology, Italy.

AD-611 475 Div. 16

Karolinska Inst., Stockholm (Sweden).
CATECHOLAMINE PRODUCTION AND RELEASE IN EXPOSURE AND ACCLIMATION TO COLD,
by Jean Leduc. 1961, 102p
Contract AF61 052 309
AFOSR 2336

Unclassified report

Pub. as Acta Physiologica Scandinavica (Sweden) v53 supp1183 pl-101 1961 (Copies available only to DDC users).
Research supported in part by the National Research Council of Canada, Ottawa.

Descriptors: (*Amines, Heat production (Biology)), Heat production (Biology), Levarterenol), Hypothermia, Body temperature, Epinephrine, Excretion, Acclimatization, Stress (Physiology), Tissues (Biology), Urine, Diet, Reserpine, Autonomic agents, Sympatholytic agents, Starvation, Sweden.

Warm- and cold-acclimated rats could withstand prolonged exposure to cold after restriction of food. Their catecholamine excretion rapidly attained maximal values and the animals died in hypothermia. The same happened with warm-acclimated rats whose insulation had been reduced by removal of the fur. Cold-acclimated clipped rats survived in the cold, but their catecholamine response was much more intense than that of intact cold-acclimated animals. These two series of experiments strongly support the view that acclimation to cold is limited by the finite capacity of the organism to produce and/or secrete sufficient amounts of catecholamines to maintain thermal balance. They also emphasize the necessity for cold-acclimated animals to reach a new level of acclimation when conditions are changed. The previous degree of acclimation increases the chances to attain that new state of equilibrium by virture of an increased sensitivity of cold-acclimated rats to catecholamines, thus extending the time at which the catecholamine production and/or secretion becomes saturated. The importance of adrenaline as a supplementary hormone of defense against cold is shown by the lower ability of adrenalectomized corticoids maintained rats to support cold exposure under severe conditions. (Author)

AD-611 478 Div. 16

Brussels Free Univ. (Belgium).
STUDY OF THE EFFECTS OF MERCAPTOETHANOL AND OF DITHIODIGLYCOL ON THE CELLULAR DIVISION OF AMPHIBIAN EGGS (Etude des Effets du Mercaptoethanol et du Dithiodiglycol sur la Division Cellulaire chez les Oeufs D'Amphibiens)
by S. Limbosch-Rollin and J. Brachet. 12 Dec 60, 12p
Contract AF61 052 356
AFOSR 2171

Unclassified report

Pub. in Experimental Cell Research (U. S.) v24 pl20-30 1961 (Copies available only to DDC users).
Text in French.

Descriptors: (*Mitosis, Inhibition), (*Cells (Biology), Mitosis), (*Amphibians, Eggs), Cytology, Thiols, Alcohols, Belgium.

The effects of beta-mercaptoethanol, an -SH compound of high reducing capacity, were compared with those of its oxidation product, dithiodiglycol. Both compounds inhibit cell division in cleaving amphibian eggs. Both compounds cause a regression of the achromatic figure of amphibian eggs, but they have different modes of action. Mercaptoethanol accelerates the regression of the mitotic apparatus, while dithiodiglycol opposes the regression. (Author)

AD-611 480 Div. 16

Lund Univ. (Sweden).
UPTAKE OF DOPAMINE BY THE STORAGE GRANULES OF THE ADRENAL MEDULLA IN VITRO,
by Ake Bertler, Gosta Hall, Nils-Ake Hillarp, and Evald Rosengren. 1 Mar 61, 4p
Grant PHS B2854
AFOSR 2025

Unclassified report

Pub. in Acta Physiologica Scandinavica (Sweden). v52 p167-70 1961 (Copies available only to DDC users).

Descriptors: (*Amines, Absorption (Biological)), (*Adrenal glands, Amines), Epinephrine, Penetration, Granules, Adenosine phosphates, Bovines, Sweden.

Large amounts of dopamine are taken up by the amine storage granules of the cow adrenal medulla when the granules are incubated at + 31 C in a solution containing dopamine. At this temperature, the amine accumulates even against an apparent concentration gradient but at O C only small amounts--if any at all--are incorporated. The amine seems to be bound in the granules but is released on osmotic lysis of the granules. (Author)

AD-611 482 Div. 16

California Univ., Los Angeles. School of Medicine.
IMPEDANCE MEASUREMENTS IN BRAIN TISSUE OF ANIMALS USING MICROVOLT SIGNALS,
by W. R. Adey, R. T. Kado, and J. Didio.
17 Oct 61, 20p
Contract AF49 638 686; Grant PHS M3708
AFOSR 2286

Unclassified report

Pub. in Experimental Neurology (U. S.) v5 n1 p47-66 Jan 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Brain, Electrical impedance), Nervous system, Physiology, Electroencephalography, Stimulation, Anesthesia, Barbiturates, Hallucinogens, Sleep.

AD-611 502 Div. 16

Brussels Free Univ. (Belgium).
SOME BIOCHEMICAL EFFECTS OF BETA-MERCAPTOETHANOL ON THE LIVER OF MICE AND RATS (Quelques Effets Biochimiques du beta-Mercaptoethanol sur le Foie de Souris et de Rat),
by J. Brachet, M. Cape, M. Decroly, and N. Six.
20 Jan 61, 10p
Contract AF61 052 356
AFOSR 2172

Unclassified report

Pub. in Biochimica et Biophysica Acta (Netherlands) v51 p347-56 1961 (Copies available only to DDC users)
Text in French.

Descriptors: (*Thiols, Biochemistry), (*Liver, Thiols),

(*Amino acids, Inhibition), Alcohols, Organic sulfur compounds, Adenosine phosphates, Desoxyribonucleic acids, Ribonucleic acids, Proteins, Enzymes, Labeled substances, Mice, Rats, Belgium.

The effects of beta-mercaptoethanol (HSCH2-CH2OH) on the biochemistry of mouse and rat liver were studied both in vivo and in vitro. The intra-peritoneal injection of mercaptoethanol has no appreciable effect on the soluble -SH, ATP, DNA, and RNA content of the cells. Mercaptoethanol exerts a very definite inhibitory effect on the incorporation of labeled amino acids into liver proteins both in vivo and in vitro (30-40% inhibition). Mercaptoethanol, if injected in vivo, does not set free one of the enzymes characteristic of lysosomes, acid phosphatase; there is no liberation of acid phosphatase when a particulate fraction containing the lysosomes is treated by mercaptoethanol in vitro. (Author)

AD-611 504 Div. 16

Brussels Univ. (Belgium).
STUDY OF THE BIOCHEMICAL EFFECTS OF MERCAPTOETHANOL (Etude des Effets Biochimiques du Mercaptoethanol),
by M. Decroly, Nicole Six, and M. Cape. 1961, 2p
Contract AF61 052 356
AFOSR 2173

Unclassified report

Pub. in Archives Internationales de Physiologie et de Biochimie (Belgium) v69 n3 p381-2 1961 (Copies available only to DDC users).
Presented at the meeting of the Belgian Society of Biochemistry (no. 33) held at Liege, 18 Mar 61.
Document in French.

Descriptors: (*Thiols, Biochemistry), Alcohols, Adenosine phosphates, Inhibition, Biosynthesis, Proteins, Enzymes, Ribonucleic acids, Amino acids, Belgium.

AD-611 505 Div. 16, 28

Cambridge Univ. (England).
THE EFFECT OF TWO 'TRANQUILLIZERS' ON AUDITORY DISCRIMINATION AND DELAYED RESPONSE PERFORMANCE OF MONKEYS,
by Charles G. Gross and Lawrence Weiskrantz. 1961, 7p
Contract AF61 052 185
AFOSR 1724

Unclassified report

Pub. in Quarterly Journal of Experimental Psychology (Gt. Brit.) v13 pt1 p34-39 Feb 1961 (Copies available only to DDC users).

Descriptors: (*Tranquilizers, Auditory perception), (*Auditory perception, Tranquilizers), Reaction (Psychology), Psychotropic agents, Reserpine, Monkeys, Sensory perception, Great Britain.

Five rhesus monkeys were tested on performance of an auditory discrimination and a delayed response test with a sliding scale of increasing difficulty after treatment with (a) 0.2 to 0.5 mgm/kgm reserpine, (b) 150 mgm/kgm meprobamate, (c) an equivalent saline injection, and (d) no treatment. Both drug treatments resulted in a severe deficit on the auditory discrimination and no change or improvement in delayed response performance. The auditory deficit was not due simply to an increased latency of response. It is suggested that these results support the hypothesis that reserpine and meprobamate reduce the utilization of sensory information. (Author)

AD-611 509 Div. 16, 4

Queen Mary Coll., Univ. of London (England).
EFFECT OF ISONICOTINYL HYDRAZIDE ON THE PATH OF CARBON IN PHOTOSYNTHESIS,
by G. G. Pritchard, C. P. Whittingham, and Wendy J. Griffin. 1959, 3p
Contract AF61 052 245
AFOSR 1642

Unclassified report

Pub. in Nature (Gt. Brit.) v190 n4775 p553-4 May 6, 1961 (Copies available only to DDC users).

Descriptors: (*Algae, Photosynthesis), (*Photosynthesis, Tracer studies), (*Isoniazid, Photosynthesis), (*Carbon, Metabolism), Amino acids, Organic phosphorus compounds, Sucrose, Enzymes, Great Britain.

In a study of the pathways of incorporation of carbon-14 from labelled carbon dioxide into the amino-acids glycine and serine during photosynthesis, the compound isonicotinyl hydrazide (isoniazid) was used. Isoniazid had only a small effect on the total fixation of carbon-14 and on the distribution between the ethanol-soluble and ethanol-insoluble fractions. The incorporation of carbon-14 into sugar phosphates, phosphoglyceric acid, phosphoenol pyruvic acid, aspartic acid, malic acid, fumaric acid and alanine is considerably reduced by treatment with isoniazid. Incorporation into sucrose is stimulated at the lower concentration and slightly inhibited at the higher concentration. Incorporation into glycollic acid and glycine, is stimulated about 5- to 8-fold by treatment with 0.01 M isoniaztd. Incorporation into serine is inhibited to the same extent as that into sugar phosphates, phosphoglyceric acid, etc. The results do not indicate specific inhibition of transaminases by isoniazid but suggest a different site of action. (Extracted)

AD-611 522 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROBLEMS IN BIOLOGY AND BORDERLINE MEDICINE: SELECTED ARTICLES,
by Kh. Berdykulov and V. P. Kostina. 15 Feb 65, 13p FTD-TT-64-636
TT 65-61767

Unclassified report

Unedited rough draft trans. of Voprosy Biologii i Kraevoi Meditsiny (USSR) 1963, v. 4, p. 123-130.

Descriptors: (*Photosynthesis, Algae), (*Algae, Biochemistry), Culture media, Light, Stimulation, Photosensitivity (Biological), USSR.

Contents:
Photosynthesis of Chlorella vulgaris beyer at mass cultivation in open basins of Uzbekistan.
Some data on the chemical composition of Chlorella vulgaris beyer grown in open tanks.

AD-611 548 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WHEN DOES RADIATION RECEDE,
by P. Sazonov. 11 Feb 65, 10p FTD-TT-64-948
TT 65-61781

Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 10, 12 Jan, p. 6.

Descriptors: (*Radioprotective agents, Radiobiology), Radiation sickness, Radiation effects, Radiological dosage, Tissues (Biology), Pathology, Drugs, Thresholds (Physiology), Toxicity, USSR.

The possibility of protecting human beings against ionizing radiation with the aid of chemical substances is discussed. The effectiveness and the toxicity of several known radioprotective agents is described.

AD-611 563 Div. 16
CFSTI Prices: HC$2.00 MF$0.50

Gottingen Univ. (West Germany). Physiological Inst.
RESEARCH ON CARDIAC PRESSORECEPTORS.
Final rept. for 1 Jan 62-31 Jan 64,
by K. Kramer. Dec 64, 30p
Contract AF61 052 541, Proj. 7163, Task 716302
AMRL TR-64-94
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
A copy is available for public sale.

Descriptors: (*End organs, Heart), (*Heart, Blood circulation), Cardiovascular system, Blood vessels, Nerves, Nerve impulses, Epinephrine, Amines, Sympathomimetic agents, Sympatholytic agents, Stimulation, Physiology, Dogs, West Germany.

Pressoreceptor reflexes affecting coronary blood flow were investigated. No indication of reflexly induced changes of coronary vascular resistance has been found. Peripheral vegal stimulation resulted in a 25% increase in diastolic flow indicating vagal influence on the resistance of coronary vessels. Adrenaline injected into a coronary branch led to dilation prior to its effect on the contractile force of the heart. The effects of two representative catecholamines on coronary blood flow were investigated. Using a beta-receptor blocking agent, both constrictor and dilator effects have been observed following adrenergic stimuli. Separate pressure elevation in the main trunk of the left coronary artery caused peripheral dilation. Bradycardia was also observed. Although this is believed to be a part of a depressor reflex action, there is no evidence that there exists within the coronary vessels a separate reflexogenic area comparable in intensity to the aortic arch and carotid sinus. Moreover, branches from the aortic nerve must be assumed to be distributed as far as the coronary ostis. In such event, the coronary area must be considered to contribute a part of the systemic activation. (Author)

AD-611 592 Div. 16

Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
A MOUSE RESTRAINT FOR INTRACEREBRAL INJECTION,
by I. W. Coleman and G. E. Patton. 12 Jun 64, 4p
Technical note no. DCBRL-6410
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p173-5 1965 (Copies available only to DDC users).

Descriptors: (*Injection (Medicine), Mice), (*Laboratory equipment, Injection (Medicine)), Laboratory animals, Cerebrum, Convulsive disorders, Design, Canada.

AD-611 593 Div. 16

Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
THE USE OF Cr51 AS A CRITERION OF THYMOCYTE REGENERATION AFTER WHOLE BODY X-IRRADIATION,
by P. V. Vittorio, P. J. Baker, and S. Dziubalo-Blehm.
27 Aug 64, 10p Rept. no. DCBRL-441
Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p19-27 1965 (Copies available only to DDC users).

Descriptors: (*Whole body irradiation, Regeneration), (*Regeneration, Cells (Biology)), (*Tracer studies, Regeneration), (*Radiation damage, Tracer studies), Rats, Thymus, Cytology, X rays, Chromium, Radioactive isotopes, Tissues (Biology), Radiological dosage, Reproductive system, Radioprotective agents, Canada.

The uptake of Cr51 chromate by thymocytes in vitro after whole body X-irradiation can be used as a sensitive quantitative criterion not only for the evaluation of early radiation damage to these cells but also as a measure of later regeneration. The development of the radiation lesion is characterized by a reduction in the in vitro uptake of Cr51 and the later regeneration of new cells by an increase in Cr51 uptake which is probably due to increased uptake of Cr51 by the young newly formed cells in the damaged tissue which is proliferating in an attempt to repair the damage. The return of the Cr51 uptake to normal is an indication of the time required for the cell population (ratio of young to older cells) to return to normal. By this technique the effect of different doses of X-irradiation on the regeneration of thymocytes has been demonstrated. Treatment with AET before whole body X-irradiation (400 r) indicated that less regeneration was necessary but the recovery time remained unchanged. Age differences produced a change in the extent of repair or regeneration but no change in recovery time. Spermatozoa showed evidence of early damage after whole body X-irradiation. This damage increased with time with no evidence of increased regeneration or repair. (Author)

AD-611 594 Div. 16

Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
THE EFFECT OF X-IRRADIATION ON THE METABOLISM OF RIBONUCLEIC ACID IN THE NUCLEI OF THYMOCYTES AND EHRLICH ASCITES CARCINOMA CELLS,
by J. F. Scaife. 24 Aug 64, 5p Rept. no. DCBRL-443
Unclassified report

Pub. in Canadian Journal of Biochemistry v43 p119-22 1965 (Copies available only to DDC users).

Descriptors: (*Radiation effects, Nuclei (Biology)), (*Ribonucleic acids, Radiation effects), X rays, Metabolism, Cells (Biology), Thymus, Cancer, Edema, Mitosis, Ionization, Morphology (Biology), Degradation, Biosynthesis, Cytology, Canada.

Results showed that X-irradiation has an effect on the rapidly labelled RNA II fraction of thymocyte nucleoli, but this was found only 3-4 hours after irradiation, at which time an appreciable number (40%) of the cells show morphological degeneration. The loss of s-RNA and monoribonucleotides is possibly a permeability effect resulting from the degeneration of the cell, although the m-RNA component of the s-RNA may also be reduced due to decreased synthesis in the nucleolus. No effects were noticed in Ehrlich ascites cells, although under these

conditions the cells suffered mitotic delay and loss of proliferative capacity. After this dose of X-irradiation, no other changes were found in RNA fractions in ascites cells that could account for the observed cytological effects, or the reversal of these effects by the prior administration of RNA to irradiated cell cultures reported by other workers. (Author)

AD-611 607 Div. 16

Antioch Coll., Yellow Springs, Ohio.
QUANTITATIVE ANALYSIS OF EVOLUTION OF THE BRAIN IN MAMMALS,
by Harry J. Jerison. 21 Nov 60, 3p
Contract AF49 638 536
AFOSR 208
Unclassified report

Pub. in Science (U. S.) v133 n3457 p1012-4 Mar 31 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Paleontology, Brain), (*Brain, Mammals), Body weight, Animals, Least squares method, Equations.

Empirical equations derived from brain size (E) and body size (P) of archiac-Eocene, Oligocene, and Recent mammals were all of the form E=kP2/3; k=0.03 for the Eocene, 0.06 for the Oligocene, and 0.12 for the Recent groups. It is suggested that k, which has been used as an index of cephalization in contemporary mammals, may be an appropriate measure of brain evolution in the mammals as a class. (Author)

AD-611 618 Div. 16

National Research Council of Canada, Ottawa (Ontario). Div. of Biosciences.
RADIAL MOVEMENT OF C14-TRANSLOCATES FROM SQUASH PHLOEM,
by J. A. Webb and P. R. Gorham. 23 Jul 64, 10p
Rept. no. NRC-8190
Unclassified report

Pub. in Canadian Journal of Botany v43 p97-103 1965 (Copies available only to DDC users).

Descriptors: (*Plants (Botany), Tracer studies), (*Plant tissue, Autoradiography), (*Autoradiography, Plant tissue), Radioactive isotopes, Carbon, Carbon dioxide, Transport properties, Sucrose, Permeability, Canada.

A time sequence study of the movement of C(14)-assimilates at the tissue level was carried out with squash. Tissue of mature and immature petioles, stem, and hypocotyl were examined after 1-minute exposures of the primary leaf blade to C(14)O2. C(14)-Translocates were transported in the phloem from the mature leaf simultaneously toward the root and young organs of the upper plant. Rapid movement of the C(14)-front in the phloem was not due to gaseous diffusion of C(14)O2. Radial movement of C14-translocates occurred along the entire length of the phloem, ultimately supplying C(14) to every living cell of the plant within 2 hours of assimilation. The velocity and rate of radial movement depended on the stage of development of each plant organ. Young and rapidly expanding petioles displayed maximum velocities of about 6 cm/hour whereas older tissues showed velocities of about 1 cm/hour. These values compared favorably with those known for protoplasmic streaming but contrasted sharply with the velocity of C(14) conducted longitudinally in the phloem and estimated at between 250 to 300 cm/hour. Radial movement of C(14)-translocates appeared to occur in the form of sucrose rather than stachyose, which suggested a differential permeability of the conducting elements of the phloem toward these two sugars. (Author)

AD-611 639 Div. 16, 4

Ohio State Univ., Columbus. Research Foundation.
CARBOHYDRATE DERIVATIVES FOR PROTECTION FROM RADIATION DAMAGE.
Final rept. for 1 Oct 60-30 Jun 64,
by M. L. Wolfrom, D. Horton, D. H. Hutson, H. G. Garg, and W. A. Cramp. 3 Feb 65, 56p
Rept. no. 1187-11
Contract DA49 193MD2143, Proj. 1187
Unclassified report

Partially pub. in Journal of Organic Chemistry. (Copies not available to DDC or Clearinghouse customers)
See also AD-287 219.

Descriptors: (*Radioprotective agents, Synthesis (Chemistry)), (*Carbohydrates, Synthesis (Chemistry)), (*Glucose, Organic sulfur compounds), Monosaccharides, Amines, Guanidines, Ureides, Bromides, Halides, O-Heterocyclic compounds.

Contents (reprints from J. Org. Chem.):
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Conversion of 2-amino-2-deoxy-1-thio-D-glucose derivatives into glycosyl halide derivatives. A tetra-O-acetylglycosylsulfenyl bromide, by D. Horton, M. L. Wolfrom, and H. C. Garg. 28, 2992 (1963)
3,4,6-Tri-O-acetyl-2-amino-2-deoxy-alpha-D-galactopyranosyl bromide hydrobromide, by M. L. Wolfrom, W. A. Cramp, and D. Horton. 28, 3231 (1963).

AD-611 643 Div. 16

National Research Council of Canada, Ottawa (Ontario). Div. of Biosciences.
CHARACTERIZATION OF LIPOVITELLENIN COMPONENTS, AND THEIR RELATION TO LOW-DENSITY LIPOPROTEIN STRUCTURE,
by J. Augustyniak, W. G. Martin, and W. H. Cook.
21 Feb 64, 8p Rept. no. NRC-8233, BBA-55084
Unclassified report

Pub. in Biochimica et Biophysica Acta (Netherlands) v84 p721-8 1964 (Copies available only to DDC users).

Descriptors: (*Lipoproteins, Biochemistry), Molecular weight, Proteins, Peptides, Lipids, Distillation, Eggs, Canada.

When aqueous solutions of the low-density lipoprotein fraction (LDF) of egg yolk and its two fractions LDF sub 1 and LDF sub 2 were extracted with ethyl ether, all yielded five derived components having sedimentation rates of bout 4S, 7S, 13S, 15S, and 17S. These components were formed sequentially in the order of 7S - 4S - 13S, and all contain the same proteins, although different combinations of polypeptide chains may be present. A reduction in lipid content below 50% causes an aggregation of 4-S particles to form 13S and other rapidly sedimenting products. The sizes of the protein moieties, computed from the molecular

weight and lipid content of the native fractions LDF sub 1 and LDF sub 2 and the derived products 7S and 4S are in the order 8, 4, 2 and 1, respectively, with the smallest unit size estimated to be (1.7 ± 0.16) times 10 to the 5th power. The size of this protein moiety decreases stepwise as the lipid content decreases down to 4S, and this behavior, plus aggregation at low lipid contents, yields detectable and separable components in both the natural and derived form of these lipoproteins. (Author)

AD-611 647 Div. 16

Puerto Rico Univ., San Juan.
ANTIGENIC RELATIONSHIPS AMONG MOSQUITOES AND SAND FLIES DEMONSTRATED BY AGAR-GEL TESTS,
by Irving Fox, Wilda B. Knight, and Ileana G. Bayona.
26 Oct 62, 8p
Grants PHS E1225, PHS RG7152
Unclassified report

Pub. in Journal of Allergy (U. S.) v34 n3 p196-202 May-Jun 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bites and stings, Antigens and antibodies), Allergy, Insects, Immunology, Antigen-antibody reactions, Culicidae, Aedes, Culex, Puerto Rico.

The data suggest that species of the same genus, as Aedes aegypti and Aedes taeniorhynchus, may be very similar antigenically, those of different genera, as Aedes and Culex, may cross-react to a great degree but have demonstrably unique antigens, and those of different families as Culicidae (mosquitoes) and Ceratopogonidae (sand flies) demonstrate little antigenic relationship. If these serological tests are to be used as an indication, one may conclude that an attempt to desensitize a subject sensitive to sand fly bites by using extracts of mosquitoes or any other immunologically unrelated family of insects would fail. Nevertheless, results from pooled extracts indicated that a mixture of insect species might succeed in the desensitization of a particular case of allergy even without knowledge of the exact offending species, provided that the selection of insect species for the extract be based on epidemiological data and serological tests.

AD-611 650 Div. 16

Johns Hopkins Univ., Baltimore, Md. School of Hygiene and Public Health.
A COMPARISON OF PRODUCTS OBTAINED BY VARIOUS PROCEDURES USED FOR THE EXTRACTION OF GLYCOGEN,
by Stanley A. Orrell and Ernest Bueding. 18 May 64, 7p
Contract Nonr341700; Grant NIH HE05268
Unclassified report

Pub. in Journal of Biological Chemistry (U. S.). v239 n12 p4021-26 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Glycogen, Distillation), Molecular weight, Water, Tissues (Biology), Stability, Chemical bonds, Cells (Biology), Biochemistry.

The conventional procedures for the extraction of glycogen--hot alkali, cold organic acid, or hot water--result in considerable degradation and distortion of the molecular weight spectrum of this polysaccharide. This is shown by a comparison of the products thus obtained with glycogen isolated by means of a cold water procedure which avoids selective losses due to differential sedimentation. Glycogens obtained by this milder procedure exhibit weight average molecular weights ranging from 100 to 500 million and extreme polydispersity. The shapes of the molecular weight distributions are highly characteristic for a given tissue or species. When glycogen is extracted by more drastic or by less quantitative procedures, these differences can no longer be observed. Glycogen obtained by means of the cold water procedure is stable in the presence of various agents that are known to disrupt hydrogen bonds and to disperse aggregates. The cold water procedure has no effect on the molecular size and distribution of alkali-extracted glycogen added to the tissue homogenate prior to the extraction. These and other observations discussed in this paper indicate that the product obtained by the cold water procedure approaches more closely the state of glycogen in the living cell than the products of the various extraction methods used hitherto. (Author)

AD-611 653 Div. 16, 4

Columbia Univ., New York. Coll. of Physicians and Surgeons.
ON THE HETEROGENEITY OF THREE-TIMES-CRYSTALLIZED ALPHA-CHYMOTRYPSIN,
by Bernard F. Erlanger, A. G. Cooper, and Arnold J. Bendich. 26 Jun 64, 5p
Contract Nonr26673; Grant NIH AI01672
Unclassified report

Pub. in Biochemistry (U. S.) v3 n12 p1880-83 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Chymotrypsin, Chemical properties), Calcium, Electrophoresis, Reaction kinetics, Stability, Buffers (Chemistry), Recrystallization.

Evidence is presented for the existence of at least two active components in 3 x-crystallized alpha-chymotrypsin. These components are shown by means of an ' all-or-none' assay and by kinetic studies to have different specific activities and to be affected differently by incubation at various temperatures in the absence of Ca(2+). Both components are stabilized and activated to a similar degree by Ca(2+) and can be separated by agar-gel electrophoresis in the absence of Ca(2+). They migrate as a single component when Ca(2+) is added to the buffer solution. It is suggested that Ca(2+) be incorporated in all buffer media used for studies on alpha-chymotrypsin. (Author)

AD-611 655 Div. 16

Kent State Univ., Ohio.
A MATHEMATICAL DESCRIPTION OF THE TOXICITY OF 'SERNYL' TO GOLDFISH,
by Charles G. Wilber. 17 May 63, 4p
Contract DA49 193MD2216
Unclassified report

Pub. in Ohio Journal of Science (U. S.) v65 n1 p43-46 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Piperidines, Toxicity), (*Fishes, Piperidines), Drugs, Tolerances (Physiology), Dosage, Cyclohexanes, Mathematical analysis, Anesthetics.

The toxicity of the drug 1- (1-phenylcyclohexyl) piperidine, 'sernyl', to goldfish, Carassius auratus, was tested. Median tolerance limits, median lethal concentrations (LCt 50) and the relation of the quantity Ct to time

were calculated. The relation of concentration of sernyl to time of exposure may be expressed by the equations: Ct = 34 + 23t(0.43). The results indicate that at higher concentrations of sernyl the LCt 50 is less than at lower concentrations. The value of K = 34 in the above equation provides a new constant for the tolerance of goldfish to serynl. (Author)

AD-611 656 Div. 16

Minnesota Univ., Minneapolis.
ELECTRON MICROSCOPIC OBSERVATIONS ON ACTINOPHAGES FOR STREPTOMYCES VENEZUELAE,
by B. G. Painter and S. G. Bradley. 11 Sep 64, 6p
Contract Nonr71036; Grant PHS AI01601, Proj. NR103 490
Unclassified report

Pub. in Journal of Bacteriology v89 n1 p240-4 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Viruses, Morphology (Biology)), Bacteriophages, Actinomycetales, Streptomycetaceae, Electron microscopy.

Actinophages MSP2 and MSP8 were treated with various chemical agents to determine the phages' substructure. Normal MSP2 and MSP8, shadowed with uranium, or negatively stained with uranyl acetate or phosphotungstic acid, were tadpole-shaped. The average overall length of MSP2 was 245 millimicrons, and of MSP8, 206 millimicrons. The head width of both phages was approximately 58 millimicrons; the tail of MSP2 was 61 millimicrons long, and of MSP8, 137 millimicrons. Treatment of MSP2 and MSP8 with 7.5 m ammonium hydroxide at 56 C or 8 M urea at room temperature released some of the head contents, and revealed substructures in both the heads and the tails. The tails of phages treated with 7.5 m mercaptoethanol were destroyed. (Author)

AD-611 664 Div. 16

Army Medical Research and Nutrition Lab., Denver, Colo.
HUMAN REQUIREMENTS FOR VITAMIN B6,
by H. E. Sauberlich. 1964, 17p
Unclassified report

Pub. in Vitamins and Hormones (U. S.) v22 p807-23 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Vitamin B complex, Nutrition), (*Deficiency diseases, Vitamin B complex), Diet, Children, Adults, Infants, Convulsive disorders, Proteins, Metabolism, Urine, Excretion, Blood chemistry, Electroencephalography, Medical examination, Biochemistry.

Present knowledge would indicate that the normal young adult human requires a minimum of 1.5-1.75 mg of vitamin B6 per day. Individuals consuming protein in excess of 100 gm per day may require slightly more, while with low intakes of protein, somewhat less of the vitamin appears to be required. The requirement for infants is approximately 0.40 mg per day based on the limited information available. The influence of various other factors, including physical stresses and stresses of pregnancy and lactation, sex, age groups, and diet on vitamin B6 requirements await further studies. In rare instances, patients are encountered who have metabolic defects which result in a marked increase in their requirement for vitamin B6. (Author)

AD-611 665 Div. 16

Army Medical Research and Nutrition Lab., Denver, Colo.
EXPERIMENTAL LATHYRISM: AN AUTORADIOGRAPHIC STUDY,
by Marvin L. Tanzer and Ronald D. Hunt.
27 Nov 63, 10p
Unclassified report

Pub. in Journal of Cell Biology (U. S.) v22 n3 p623-31 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bone, Autoradiography), (*Autoradiography, Bone), (*Collagen, Radioactive isotopes), Embryos, Chickens, Amino acids, Synthesis, Legs, Tissues (Biology), Proprionitrile, Morphology (Biology), Histology, Veterinary medicine.

In normal and lathyritic chick embryos bone collagen was synthesized primarily in the periosteum of the femurs, and was organized as radioactive spicules in these bones. Saline extraction of the lathyritic bones removed the radioactive spicules, although they eventually seemed to become non-extractable. Normal bone seemed to be unaffected by saline extraction. Marked variation in the degree of isotope incorporation was seen in collagenous and non-collagenous tissues. All the tissues of any one embryo, however, showed a similar degree of isotope incorporation. Tritiated beta-aminopropionitrile was diffusely distributed throughout bone and was completely removed by saline extraction. This autoradiographic study supports the postulate that a portion of extractable lathyritic collagen is recently synthesized and is organized in fibrous structures in bone. (Author)

AD-611 666 Div. 16

Army Medical Research and Nutrition Lab., Denver, Colo.
VITAMIN B6 REQUIREMENT FOR ADULT MEN,
by Eugene M. Baker, John E. Canham, William T. Nunes, Howerde E. Sauberlich and Marion E. McDowell.
1964, 8p
Unclassified report

Pub. in American Journal of Clinical Nutrition (U. S.) v15 n2 p59-66 Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Vitamin B complex, Nutrition), (*Deficiency diseases, Vitamin B complex), Males, Urine, Excretion, Proteins, Tryptophan, Ascorbic acid, Oxalates, Diet, Biochemistry.

The results of a stuoy with young adult male subjects has revealed that (1) a vitamin B6 depletion could be rapidly achieved, as was noted by measurements of urinary xanthurenic acid excretion following the oral administration of a 10 gm. DL-tryptophan load; (2) the rate of depletion was directly related to protein intake; (3) the changes in urinary vitamin B6 excretion correlate inversely with the xanthurenic acid excretion and the deficiency status; (4) the 3-hydroxykynurenine excretion was of limited use in evaluating vitamin B6 requirements; and (5) the urinary oxalate excretion showed little or no change. It is concluded that the optimal daily vitamin B6 requirement (as pyridoxine hydrochloride) for subjects on a high protein intake (100 gm.) appeared to be 1.75 to 2.0 mg. per day, while subjects on a low protein intake (30 gm.) appeared to have a requirement of 1.25 to 1.5 mg. per day. (Author)

AD-611 667 Div. 16

Army Medical Research and Nutrition Lab., Denver, Colo.
BLOOD CELL TRANSAMINASE ACTIVITY IN HUMAN VITAMIN B6 DEFICIENCY,
by Nicholas Raica, Jr., and Howerde E. Sauberlich.
1964, 6p

Unclassified report

Pub. in American Journal of Clinical Nutrition (U. S.) v15 n2 p67-72 Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Blood cells, Enzymes), (*Transferases, Blood cells), (*Deficiency diseases, Diagnosis), (*Vitamin B complex, Deficiency diseases), Erythrocytes, Leukocytes, Blood plasma, Glutamic acid, Oxalacetic acid, Phosphates, Nutrition.

The glutamic oxaloacetic transaminase activity was measured in the erythrocytes, leukocytes and plasma of human adults subjected to a vitamin B6 deficiency. The results demonstrated that the glutamic oxaloacetic transaminase activity in these blood components could not in itself be used to establish the presence of a vitamin B6 deficiency, even though the subjects studied were considered to be exceedingly deficient, based on the urinary excretion of xanthurenic acid following a tryptophan load test. The findings suggest that the in vitro stimulation of the erythrocyte glutamic oxaloacetic transaminase activity by pyridoxal phosphate may be a useful measurement in the evaluation of vitamin B6 nutritional status. (Author)

AD-611 668 Div. 16

Army Medical Research and Nutrition Lab., Denver, Colo.
PLASMA AND LIVER LIPIDS OF MICE AS INFLUENCED BY DIETARY PROTEIN AND SULFUR-CONTAINING AMINO ACIDS,
by G. A. Leveille and H. E. Sauberlich.
24 Apr 64, 7p

Unclassified report

Pub. in Journal of Nutrition (U. S.) v84 n1 p10-4 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Proteins, Diet), (*Diet, Cholesterol), (*Cholesterol, Metabolism), Nutrition, Blood chemistry, Amino acids, Blood plasma, Liver, Lipids, Fats, Biochemistry, Mice.

The influence of dietary protein level and of sulfur-containing amino acids on plasma and liver lipids was studied in young adult mice. Increasing the level of dietary protein resulted in decreased plasma and liver cholesterol and liver fat levels. A greater hypocholesterolemic effect of dietary protein was observed in mice fed a cholesterol-supplemented diet. The increased level of sulfur-containing amino acids could, in part, account for the hypocholesterolemic effect of dietary protein. (Author)

AD-611 671 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
STUDIES OF RUBELLA. I. PROPERTIES OF THE VIRUS,
by P. D. Parkman, E. L. Buescher, M. S. Artenstein, J. M. McCown, and F. K. Mundon.
23 Mar 64, 13p

Unclassified report

Pub. in Journal of Immunology (U. S.) v93 n4 p595-607 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Rubella, Biological assay), Tissue cultures, Growth, Biochemistry, Biophysics, Viruses, Interference, Immunology.

Rubella virus interfered with propagation of enteroviruses, myxoviruses and arboviruses in green monkey kidney (GMK) cultures. Mechanisms involved in production of this interference remain uncertain; no evidence of interferons has been found. Titers of infective rubella virus were measured most accurately by interference in GMK cultures incubated 10 days before challenge. These interference titers were not influenced significantly by specific type of challenge virus or its concentration. Rubella virus strains multiplied in 13 different cell systems including primary, continuous heteroploid and diploid cell lines. Tests in 11 of these showed similar rates of virus growth. Interference, however, developed differently in each culture system and could not be correlated with virus production. The virus was filterable through 300 but not 100 millimicron Millipore filters. It was destroyed by heating, ethyl ether, chloroform and formalin. Thermal inactivation rates at 37C were similar to those of rubeola, herpes simplex and influenza viruses. Propagation was not affected by 5-iodo-2 prime-desoxyuridine (IDU). No hamagglutinin or complement-fixing antigen has been shown. The findings support the original suggestion that rubella virus is unrelated to other known animal viruses. (Author)

AD-611 672 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
STUDIES OF RUBELLA. II. NEUTRALIZATION OF THE VIRUS,
by P. D. Parkman, F. K. Mundon, J. M. McCown, and E. L. Buescher. 23 Mar 64, 11p

Unclassified report

Pub. in Journal of Immunology (U. S.) v93 n4 p608-17 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Rubella, Antigens and antibodies), Immunology, Tissue cultures, Neutralization, Viruses.

Neutralizing antibody to rubella virus was measured in tissue culture by a constant virus-varying serum test. Careful control of virus dose was the most important factor for obtaining reproducible results. Antibody titers were increased by diluting sera with unheated antibody-free rabbit serum; this enhancing effect was abolished by heating. With the standard test, rubella virus strains were shown to be antigenically similar, and different from several other human viruses. The test reliably differ-entiated between antibody positive and negative sera, and with comparable virus doses showned reproducibility of antibody titer similar to other neutralization tests. The immune status of military recruits was correctly predicted by presence or absence of antibody. Antibody appearance after clinical or subclinical infection was prompt and persisted for years. (Author)

AD-611 673 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
LIVER PARENCHYMAL CELL INJURY. II. CYTOCHEMICAL EVENTS CONCERNED WITH

MITOCHONDRIAL DYSFUNCTION FOLLOWING POISONING WITH CARBON TETRACHLORIDE,
by Edward S. Reynolds. 10 Aug 64, 14p
Grants NIH AM7979, ACS E201

Unclassified report

Pub. in Laboratory Investigation (U. S.) v13 n11 p1457-70 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Liver, Pathology), (*Carbon tetrachloride, Poisoning), (*Poisoning, Mitochondria), Calcium, Toxicity, Cells (Biology), Histological techniques, Oxidoreductases, Biochemistry.

Accumulation of calcium in livers of rates between 8 and 40 hours after the oral administration of a single dose of carbon tetrachloride has been localized to mitochondria of parenchymal cells. Increases in calcium initially observed within a small number of midzonal and centrilobular cells at 8 hours are progressive and involve almost all centrilobular parenchymal cells by 40 hours. Although succinic and glutamic dehydrogenase activities are reduced centrilobularly at 8 hours, failure of dehydrogenase activity is not observed in calcium-containing cells until 24 hours and then only in cells staining most intensely for calcium. Potassium staining, decreased centrilobularly at 24 hours, is increased in this zone at 40 hours. Calcium-containing cellular debris is removed from the liver lobule by 72 hours. The entrance of massive amounts of calcium into the cells and its sequestration by mitochondria is a concomitant of the appearance of lead-staining calcium-binding sites within mitochondria and of mitochondrial enlargement. Enlarged mitochondria staining maximally for calcium eventually become unstainable with acid aniline fuchsin. With the Chalkley method, calcium contents of calcium-containing mitochondria are estimated to increase 300-fold to 12,000 micrograms of calcium per gram of mitochondria at 40 hours. (Author)

AD-611 674 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
A CENTURY OF MEDICAL ILLUSTRATION,
by Joe M. Blumberg. 1965, 10p

Unclassified report

Pub. in Military Medicine (U. S.) v130 n1 p13-22 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Medical research, Pictures), (*Anatomical models, Training devices), History, Graphics, Photography, Museums, Education, Motion pictures, Medical equipment, Medical personnel.

AD-611 675 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
HYPERTROPHIC CORNEAL SCARS (KELOIDS),
by Robert H. Fenton and Thomas J. Tredici.
1964, 6p

Unclassified report

Pub. in Survey of Ophthalmology (U. S.) v9 n6 p561-6 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cornea, Pathology), Eye, Neoplasms, Wounds and injuries, Tissues (Biology), Histological techniques, Ophthalmology.

Two examples of keloids of the cornea are presented. In the first case there was a history of inflammation preceding the development of the corneal lesion. In the second case there was historical and histologic evidence of a perforating injury of the cornea. In both cases the anterior segment of the globe was deformed by a staphylomatous, thickened, fibrovascular scar. Such lesions are uncommon and in the past have been considered by some authors to be new growths of the cornea. (Author)

AD-611 676 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
PANCREATIC ISLET CELL TUMOR IN A DOG,
by L. C. Marcus, T. J. Bucci, and K. L. Kraner.
1964, 6p

Unclassified report

Pub. in Journal of the American Veterinary Medical Association (U. S.) v145 n12 p1198-1203 Dec 15, 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Dogs, Neoplasms), (*Neoplasms, Pancreas), Veterinary medicine, Toxic tolerances, Histological techniques, Surgical techniques, Medical examination, Pathology.

A functional islet cell tumor was diagnosed in a dog with initial signs of collapse after exercise. Laboratory studies revealed hypoglycemia and impaired glucose tolerance. A solitary tumor was removed surgically from the pancreas, and diagnosis was confirmed histologically. The dog died on the 3rd postoperative day, and no metastases were found at necropsy.

AD-611 677 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
BIOLOGICAL POTENTIALS OF AUSTRALORBIS GLABRATUS: GROWTH AND MATURATION,
by Lawrence S. Ritchie, Luis A. Berrios-Duran, and Robert Deweese. 1963, 6p

Unclassified report

Pub. in American Journal of Tropical Medicine and Hygiene. v12 n2 p264-68 Mar 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Schistosoma, Disease vectors), (*Gastropoda, Biology), Growth, Eggs, Reproduction (Physiology), Control, Mollusca.

Laboratory studies on the biology of Australorbis glabratus, snail vector of Schistosoma mansoni, revealed that the period from hatching to laying may be as brief as 3 weeks. Allowing 8 to 9 days for incubation of eggs, the egg-to-egg cycle is potentially 1 month. In one experiment the mean diameter at maturity was 12.8 mm. The best growth rate, obtained with snails in continuously changing tap water, was 20 mm in 2 months. These results are believed to approach the biological potentials of A. glabratus--they are consistent with limited field observations on growth; they explain the profound capacity of the snail for repopulation after stress of natural conditions and molluscicide; and they are pertinent to the epidemiology of the disease. (Author)

AD-611 678 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
A HISTOPATHOLOGIC BASIS FOR THE INTERPRETATION OF SMALL BOWEL ROENTGENOGRAPHY IN TROPICAL SPRUE,
by Martin H. Floch, William L. Caldwell, and Thomas W. Sheehy. 1962 8p
Unclassified report

Pub. in American Journal of Roentgenology, Radium Therapy and Nuclear Medicine (U. S.) v87 n4 p709-16 Apr 62 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Deficiency diseases, X-ray photography), (*X-ray photography, Deficiency diseases), (*Histological techniques, Deficiency diseases), (*Intestines, X-ray photography), Absorption (Biological), Barium, Hematology, Tissues (Biology).

Small bowel roentgenographic series, absorption tests, and small bowel biopsy specimens were studied in 18 patients with tropical sprue. Twelve cases were untreated and 6 were treated. An excellent correlation was observed in the 3 parameters of testing. In untreated patients, where biopsy specimens and absorption tests were most abnormal, the small bowel roentgen examination was most abnormal. In treated patients where the biopsy and absorption tests were only minimally abnormal, the roentgen series was only slightly abnormal. (Author)

AD-611 682 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
TRANSFER OF EPISOMIC ELEMENTS TO PROTEUS. II. NATURE OF LAC(+) PROTEUS STRAINS ISOLATED FROM CLINICAL SPECIMENS,
by Stanley Falkow, J. A. Wohlhieter, R. V. Citarella, and L. S. Baron. 25 Jul 64, 5p
Unclassified report

Pub. in Journal of Bacteriology (U. S.) v88 n6 p1598-1601 Dec 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Proteus, Genetics), (*Genetics, Bacteria), Lactic acid, Desoxyribonucleic acid, Chromosomes.

Strains of Proteus mirabilis exhibiting the unusual property of utilizing lactose (lac(+)) have been reported in clinical material. A genetic examination discloses that the lac(+) determinants in these Proteus strains are associated with an infectious element, P, which is distinct from the sex factor of Escherichia coli K-12. The composite genetic element, P-lac, is readily transmissible to other enteric species and possesses properties which conform to those of an episomic element of the transfer variety. CsCl density-gradient studies of deoxyribonucleic acid (DNA) extracted from lac(+) P. mirabilis indicate that the P-lac(+) element did not arise in this species, but was acquired from an organism possessing a markedly different DNA base composition. (Author)

AD-611 683 Div. 16

Johns Hopkins Univ., Baltimore, Md. School of Hygiene and Public Health.
A MILD PROCEDURE FOR THE ISOLATION OF POLYDISPERSE GLYCOGEN FROM ANIMAL TISSUES,
by Ernest Bueding and Stanley A. Orrell.
18 May 64, 4p
Grants NIH HE05268, AI03515
Unclassified report

Pub. in Journal of Biological Chemistry (U. S.) v239 n12 p4018-20 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Glycogen, Solvent extraction), Tissues (Biology), Ascaris, Water, Proteins, Molecular weight, Biochemistry.

In an attempt to obtain a product more closely approaching the state of glycogen in intact animal tissues, a procedure for the extraction of this polysaccharide is described. This procedure is designed to avoid physical and chemical alteration by strong alkali, acid, or high temperature and distortion of the molecular weight spectrum resulting from selective losses during sedimentation. (Author)

AD-611 684 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
ATTEMPTS TO INDUCE RESISTANCE AGAINST SCHISTOSOMA MANSONI BY INJECTING CERCARIAL, ADULT WORM, AND EGG HOMOGENATES IN SEQUENCE,
by Lawrence S. Ritchie, Seymour Garson and Duane G. Erickson. 24 Jul 61, 4p
Unclassified report

Pub. in Journal of Parasitology (U. S.) v48 n2 p233-6 Apr 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Schistosoma, Immunity), (*Vaccines, Schistosoma), Parasites, Worms, Eggs, Antigens and antibodies, Tolerances (Physiology), Infections, Mice.

A series of mice was injected repeatedly with saline homogenates of cercariae, adult worms and eggs, consecutively, the natural sequence of occurrence in the infection. Each antigen also was used singly in separate groups of mice. The course of the infection following challenge was essentially unaltered in all experimental series as indicated by worm numbers, worm length, and occurrence of eggs in the tissues. (Author)

AD-611 685 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
CONFERENCE ON INTESTINAL MALABSORPTION AND ALLIED HEMATOLOGIC PROBLEMS. SAN JUAN, PUERTO RICO, MARCH 20-22, 1962,
by Irvin C. Plough. 22 Mar 62, 39p
Unclassified report

Pub. in American Journal of Digestive Diseases (U.S.) v7 (NewSer) n11 p955-92 Nov 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gastrointestinal system, Diseases), (*Deficiency diseases, Puerto Rico), Nutrition, Diet, Metabolism, Pathology, Hematology, Epidemiology, Excretion, Anemias, Absorption (Biological), Therapy, Biochemistry, Histological techniques, Military medicine, Abstracting.

AD-611 686 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
CONFERENCE ON INTESTINAL MALABSORPTION AND ALLIED HEMATOLOGIC PROBLEMS. SAN JUAN, PUERTO RICO, MARCH 3-5, 1964,
by Michael P. Dacquisto, Mario Garcia-Palmieri, Munsey S. Wheby, and Theodore M. Bayless.
5 Mar 64, 43p

Unclassified report

Pub. in American Journal of Digestive Diseases (U. S.) v9 (NewSer) n11 p769-810 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gastrointestinal system, Diseases), (*Deficiency diseases, Puerto Rico), Nutrition, Diet, Metabolism, Pathology, Histological techniques, Absorption (Biological), Hematology, Anemias, Excretion, Therapy, Epidemiology, Biochemistry, Military medicine.

AD-611 687 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
EFFECTS OF TRIIODOTHYRONINE IN ALTERING THE RESPONSE OF KIDNEYS TO COBALT-60 RADIATION,
by William L. Caldwell, Robert W. Thomassen, and Antonio Bosch. 1963, 7p
Proj. 6 x 97 85 001

Unclassified report

Pub. in Radiology (U. S.) v81 n4 p657-663 Oct 1963 (Copies not available to DDC or Clearinghouse customers). Presented at the Annual Meeting of the Radiological Society of North America (no. 48) Chicago, Ill. 25-30 Nov 1962.

Descriptors: (*Kidneys, Radiation injuries), (*Radioprotective agents, Iodine compounds), Tissues (Biology), Radiological dosage, Thyroid gland, Tissue extracts, Radiation effects, Diseases, Radioactive isotopes, Neoplasms, Blood vessels, Skin, Cancer, Cobalt, Histological techniques, Rabbits.

The fear of inducing radiation nephritis restricts the amount of radiation delivered to retroperitoneal tumors. If this radiation injury could be modified, the therapist would then be less fearful of possibly inducing this often fatal complication. Since triiodothyronine has proved beneficial in reducing radiation injury of the skin and subcutaneous tissues, the effects of this compound were evaluated following production of radiation injury in rabbit kidneys. Surprisingly, triiodothyronine did not favorably alter the reaction, but made it worse. The reason for this variance with the effects previously reported in skin is not certain. Tissue specificity or difference in vascularity may be important factors. The irradiated skin of the triiodothyronine-treated animals showed slightly less histologic alteration than the irradiated skin of the control animals. (Author)

AD-611 688 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
EVALUATION OF THE SMALL BOWEL BARIUM MOTOR MEAL WITH EMPHASIS ON THE EFFECT OF VOLUME OF BARIUM SUSPENSION INGESTED,
by William L. Caldwell and Martin H. Floch.
Jun 62, 9p

Unclassified report

Pub. in Radiology (U. S.) v80 n3 p383-91 Mar 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Intestines, Radiography), (*Radiography, Intestines), (*Barium, Radiography), Medical examination, Gastrointestinal system, Colloids, Oral, Absorption (Biological), Deficiency diseases.

If an adequate amount of plain or colloidal barium suspension is ingested, an accurate and valuable examination of the small bowel anatomy and function is obtained with little undue effort. More complicated technics are necessary in only very unusual circumstances. On the basis of analysis of duplicate small bowel examinations of 32 adults with gastrointestinal signs and symptoms (including 16 cases of tropical sprue), the use of at least 16 ounces of barium suspension in motor meal examinations is suggested. This results in a more satisfactory examination of the small bowel than is obtained when only 8 ounces of barium suspension is used. The advantages are primarily decreased time and greater ease of interpretation. Other factors influencing the small bowel study are discussed. The significance and various consequences of flocculation are analyzed. Abnormalities noted in 'malabsorption states' are described and illustrated. (Author)

AD-611 690 Div. 16

California Univ., San Francisco. Medical Center.
ROLE OF NUTRITIONAL DEFICIENCIES IN TROPICAL SPRUE,
by T. L. Althausen, L. C. deMelendez, and E. Perez-Santiago. 1961, 8p

Unclassified report

Pub. in American Journal of Clinical Nutrition (U. S.) v10 n1 p3-10 Jan 1962 (Copies not available to DDC or Clearinghouse customers). Research partly supported by the Army Tropical Research Medical Lab., APO 851, New York, and the Bayamon District Hospital, Bayamon (Puerto Rico).

Descriptors: (*Deficiency diseases, Puerto Rico), Nutrition, Diet, Anemias, Hematology, Pregnancy, Metabolism, Gastrointestinal system, Absorption (Biological), Enzymes, Etiology.

A detailed dietary history covering the period before onset of symptoms was obtained from eighty-six patients with tropical sprue and from ten patients with megaloblastic anemia of pregnancy. A comparison of the diets of these patients with minimum requirements demonstrated only a moderate deficiency of calories in the patients with sprue, whereas the diets of patients with megaloblastic anemia of pregnancy were deficient in all vitamins studied by us as well as calcium. The apparently contradictory clinical observations on the role of dietary deficiencies in the pathogenesis of tropical sprue are considered and a hypothesis resolving them is proposed: It is suggested that sprue is a manifestation of a genetically transmitted defect of metabolism which impairs intestinal absorption by affecting the energy-producing enzyme systems in the cells of the intestinal mucosa. Patients with megaloblastic anemia of pregnancy who had greater dietary deficiencies than the patients with sprue, as well as an important form of metabolic stress, but in whom sprue failed to develop, appear to confirm the importance of a genetic defect in the etiology of this disease.

AD-611 693 Div. 16, 4

Tennessee Univ., Knoxville.
PYRIMIDINE INCORPORATION INTO NUCLEIC ACIDS OF CRYNEBACTERIA SPP,
by H. Biggs and B. Doumas. 1964 11p
Contract DA49 193MD2129

Unclassified report

Pub. in Alabama Journal of Medical Sciences (U. S.) v1 n4 p376-85 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Corynebacterium, Nucleic acids), (*Nucleic acids, Pyrimidines), (*Pyrimidines, Metabolism), Tracer studies, Ribonucleic acids, Desoxyribonucleic acid, Nucleotides, Biosynthesis.

The incorporation of 5-methylbarbituric acid, uracil and orotic acid into the nucleic acids of Corynebacterium spp. was investigated. The results indicated that 5-methylbarbituric acid is not incorporated directly into RNA or DNA. Uracil was incorporated to a greater extent than 5-methylbarbituric acid, but was not a preferential precursor of the nucleic acid pyrimidines. Orotic acid appeared to be incorporated without ring rupture and preferentially into the RNA pyrimidines. Orotic acid was not a direct precursor of DNA pyrimidines. (Author)

AD-611 696 Div. 16

Naval Medical Research Inst., Bethesda, Md.
THE USE OF ROSE MULTIPURPOSE CHAMBERS AND DIALYSIS MEMBRANES IN THE CULTIVATION OF EXOERYTHROCYTIC STAGES OF AVIAN MALARIAL PARASITES.
Rept. no. 10,
by Dinniemaud V. Jensen, Clay G. Huff and Tsugiye Shiroishi. 1964, 7p
Proj. MR005 09 1030 02

Unclassified report

Pub. in American Journal of Tropical Medicine and Hygiene (U. S.) v13 n5 p653-8 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasmodium, Growth), (*Tissue cultures, Plasmodium), Parasites, Diseases, Hemosporidia, Aedes, Embryonated egg technique, Laboratory equipment, Morphology (Biology), Cells (Biology), Photographs.

A variety of chick embryo tissues infected with exoerythrocytic stages of Plasmodium fallax were grown under sheets of cellophane dialysis membranes in Rose multipurpose chambers. The parasites thus cultivated lived for extended periods of time in an environment so favorable to the chick embryo tissues that many of the cells retained some of their characteristic morphology and function. In addition pre-erythrocytic infections were initiated in chick embryo spleen cultures by introducing P. gallinaceum sporozoites from Aedes aegypti mosquitoes under the membranes. Mature segmenters were seen within 48 hours. The parasites and cells thus cultivated were easily studied by phase contrast microscopy and were photographed. (Author)

AD-611 697 Div. 16

Naval Medical Research Inst., Bethesda, Md.
ELEVATION OF BODY TEMPERATURE IN HEALTH.
Rept. no. 2,
by David Minard, Louis Copman and A. R. Dasler. 1964, 16p
Proj. MR005 01 0001 02

Unclassified report

Pub. in Annals of the New York Academy of Sciences v121 p12-25 Oct 9 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Body temperature, Heat tolerance), (*Heat tolerance, Body temperature), Adaptation (Physiology), Stress (Physiology), Metabolism, Heart, Electrocardiography, Temperature sensitive elements, Body weight.

At low rates of heat storage the rates of rise of esophageal temperature (t sub o), tympanum temperature (t sub e), and rectal temperature (t sub r) are approximately the same. During more rapid heat storage the rates of rise of t sub o and t sub e are nearly equal and more rapid than the rise in t sub r. At the maximum rate of heat storage which was observed, the rate of rise in t sub o exceeded not only t sub r but t sub e as well. During exposure to heat loads which results in transient heat storage and during the subsequent recovery period, indices of heat strain such as heart rate tend more nearly to parallel rates of temperature change in the more responsive regions. Therefore, body temperature measured in a region which responds promptly to changing heat loads, such as the lower esophagus or tympanic membrane, may prove to be a more valid index of thermoregulatory strain than so-called mean body temperature which is based on weighted readings of the skin and rectal temperatures. It is concluded that t sub o and t sub e are more sensitive indicators of changes in internal temperature than is t sub r during transient heat storage, and t sub r is a more reliable index of time of attainment of thermal equilibrium than are t sub o or t sub e. (Author)

AD-611 698 Div. 16

Naval Medical Research Inst., Bethesda, Md.
PRESERVATION OF BLOOD BY FREEZING: A REVIEW.
Rept. no. 12,
by H. T. Meryman. 26 Aug 64, 6p
Proj. MR005 02 0001 07

Unclassified report

Pub. in Cryobiology (U.S.) v1 n1 p52-6 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Blood, Preservation), (*Freezing, Blood), Low-temperature research, Erythrocytes, Additives, Storage, Blood transfusions, Hemolysis, Reviews.

Efforts to preserve human erythrocytes by freezing have proceeded along two separate lines: slow freezing with penetrating additives which must be removed by washing, and rapid freezing, using nonpenetrating additives hopefully present in low enough concentrations to permit transfusion without post-thaw processing. The slow freezing method has the advantages that the rates of freezing and thawing are not excessively demanding and that specialized equipment is not necessary for the purpose. The principal virtue of the rapid-freezing process lies in the prospect of avoiding the complex post-thaw washing procedure and entering the closed system. Since very rapid thawing is a necessary component of the rapid-freezing process, such blood should be available for transfusion within a very few minutes of its removal from storage. Specialized equipment is necessary in order to achieve high rates of freezing and thawing. Storage temperatures for long term preservation are similar to those required for glycerinated cells, and

should be below -100C. The principal obstacles facing the rapid-freezing process are the limits of acceptability for additives and the products of hemolysis. Low additive concentration results in high freeze-thaw hemolysis, whereas very high recoveries are achieved only with high additive concentrations.

AD-611 699 Div. 16

Naval Medical Research Inst., Bethesda, Md.
A PLEA FOR THE CONTINUED USE OF LOCAL ANESTHESIA IN MAJOR SURGERY.
Rept. no. 5,
by Yorke G. Jacobson. 1964, 4p
Proj. MR005 02 0020 01

Unclassified report

Pub. in Medical Annals of the District of Columbia v33 n12 p610-2 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Local anesthetics, Surgery), (*Surgical techniques, Local anesthetics).

One hundred and fifty healthy males (14-76 years of age) and 10 females (17-58 years of age) had hernioplasties performed under local anesthesia. There were 24 recurrent and 16 femoral hernias in this series. In the 160 cases a bilateral repair was performed 29 times with a total of 87 ± 6 c.c. The total complications included 3 hematomas (1.6 per cent) and 1 wound infection. Drug toxicity was not noted. All patients were interviewed the following day, and 95 per cent were well satisfied with the anesthesia. Of 29 patients who had a previous hernioplasty with general or spinal anesthesia all but 1 preferred local. The latter was the patient with the wound infection.

AD-611 700 Div. 16

Naval Medical Research Inst., Bethesda, Md.
UROLITHIASIS IN THE RAT. IV. INFLUENCE OF AMINO ACID SUPPLEMENTS ON THE OCCURENCE OF CITRATE CALCULI.
Rept. no. 3,
by Robert Van Reen, William K. Simmons, and Lawrence J. Jenkins, Jr. 23 Jan 64, 9p

Unclassified report

Pub. in Journal of Nutrition v83 n4 p358-64 Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Rats, Calculi), (*Calculi, Citrates), (*Amino acids, Calculi), Diet, Casein, Salts, Calcium compounds, Methionine, Urine, Sulfates, Chlorides, Urinary system.

Urolithiasis was investigated in the NMRI-D strain of rat fed a purified type of diet containing 15% casein and 4% salts. The predominant component of the stones produced was calcium citrate. Although previous studies indicated that increased dietary protein eliminated calculi, the present study shows that DL-methionine or L-lysine monohydrochloride supplementation are also effective in reducing the occurrence of calculi and together completely prevent the syndrome. The methionine effect is thought to be via the conversion of methionine-sulfur to inorganic sulfate which provides an acidic group in the urine. The lysine monohydrochloride effect also is believed to be due to the acidic group provided, in this case chloride. These suggestions concerning the effects of DL-methionine and L-lysine were supported by experiments in which dietary inorganic sulfate and chloride reduced the proportion of rats which developed calculi. (Author)

AD-611 701 Div. 16

Naval Medical Research Inst., Bethesda, Md.
HEMOLYSIS BY HOLOTHURIN A, DIGITONIN, AND QUILLAIA SAPONIN: ESTIMATES OF THE REQUIRED CELLULAR LYSIN UPTAKES AND FREE LYSIN CONCENTRATIONS.
Rept. no. 33,
by C. D. Thron. 20 Apr 64, 10p
Proj. NR107 613

Unclassified report

Pub. in The Journal of Pharmacology and Experimental Therapeutics v145 n2 p194-202 Jul 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hemolysis, Glycocides), (*Glycocides, Hemolysis), (*Blood cells, Surface-active substances), Erythrocytes, Cell wall, Membranes (Biology), Biological products.

The hemolytic potencies of holothurin A, digitonin, and several quillaia saponin preparations were compared in experiments with human erythrocytes. The concentrations required to produce 50% hemolysis are linear functions of the erythrocyte count in the hemolytic system. An analysis of this phenomenon yields estimates of (a) the quantity of each lysin which must be taken up by an erythrocyte in order to bring about lysis, and (b) the concentration of lysin remaining free in solution. The reciprocal of the required lysin uptake is designated the 'apparent intrinsic activity.' Expressed as the cell membrane surface area corresponding to each saponin molecule taken up, the apparent intrinsic activities range from 1050 sq. A/molecule (digitonin) to 8700 sq. A/molecule (holothurin A). The affinities of the saponins for erythrocytes are reflected in the ratios of lysin uptake to free lysin concentration. The free lysin concentrations required for 50% hemolysis are suitable indices of hemolytic 'potency.' Among the four substances studied, the orders of hemolytic potency, of affinity, and of apparent intrinsic activity are all different. Holothurin A is the most potent, hency it is among the strongest saponin hemolysins. (Author)

AD-611 703 Div. 16

California Univ., Los Angeles.
BLOOD LEVELS OF ACTH IN INDIVIDUAL ADRENALECTOMIZED RATS,
by Rene Ulrich and Margaret A. Slusher.
6 Mar 64, 6p
Grant NIH A6 066, Proj. NR110 402

Unclassified report

Pub. in Endocrinology (U. S.) v75 n4 p483-7 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Adrenocorticotropic hormones, Blood chemistry), Adrenal glands, Surger, Pituitary gland, Corticosteroid agents, Stress (Physiology), Rats.

Blood levels of ACTH in individual rats 3 and 10 days after bilateral adrenalectomy have been determined by the assay method of Lipscomb and Nelson, using the adrenal venous corticosteroid response of the 2-hr hypophysectomized rat. Three days after adrenalectomy ACTH levels in blood were equivalent to 0.08 ± 0.03 mU ACTH/ml; 10 days after adrenalectomy levels were 0.27 ±0.05 mU/ml. Pre-rinsing syringes with an acid-gelatin solution prior to collection of donor blood did not significantly alter blood levels of ACTH. The ability to measure ACTH levels in the blood of individual rats 3 and 10 days after adrenalectomy supports the previous finding of an increased sensitivity of ACTH assay with the use of the 2-hr hypophysectomized rat and measurement

of adrenal venous effluent corticosterone levels. The data suggest the feasibility of determining ACTH levels in blood of individual intact rats following conditions of stress. (Author)

AD-611 704 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
DETERMINATION OF UROPEPSIN BY MEANS OF ALBUMIN I(131). RESULTS IN TROPICAL SPRUE, HOOKWORM, AND ACHLORHYDRIC PATIENTS,
by Martin H. Floch, Genoveva Montalvo and Paul Crosby. 5 Dec 61, 6p
Unclassified report

Pub. in American Journal of Clinical Pathology (U. S.) v37 n4 p350-4 Apr 1962 (copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pepsins, Biological assay), (*Albumins, Labelled substances), Radioactive isotopes, Iodine, Tracer studies, Urine, Defficiency diseases, Nematodes, Anemias, Diagnosis.

A method for measurement of urinary proteolytic activity (uropepsin) is described in which radioactive iodinated albumin is used as the substrate. Mean values of uropepsin for untreated and treated tropical sprue patients and patients with achlorhydria are significantly less, as a group, than mean values for normal males. Hookworm patients do not have a significantly different mean value from normal persons. Values lower than 200 gammas of pepsin per 24-hr. specimen of urine are abnormal, probably reflecting decreased gastric function. The finding of low values for uropepsin in macrocytic anemia is nonspecific, and, contrary to previous reports, should not be used to distinguish pernicious anemia. (Author)

AD-611 705 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
FURTHER OBSERVATIONS ON THYROIDITIS AND COLLOID ACCUMULATION IN HYPERPLASTIC THYROID GLANDS OF HAMSTERS RECEIVING EXCESS IODINE,
by Richard H. Follis, Jr. 8 Sep 64, 11p
Unclassified report

Pub. in Laboratory Investigation (U. S.) v13 n12 p1590-99 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Thyroid gland, Pathology), (*Iodine, Thyroid gland), Colloids, Inhibition, Iodides, Dosage, Diet, Diseases, Thyroid hormones, Sulfadiazine, Thiocyanates, Histological techniques, Hamsters.

Hyperplastic thyroid glands of hamsters exhibit two alterations when certain levels of iodine are administered under defined conditions. An inflammatory reaction appears. With increasing amounts of iodine, colloid reaccumulation is inhibited. The dosage levels of iodine necessary to elicit these reactions have been determined. Chemical agents, such as thiouracil, sulfadiazine, or thiocyanate, inhibit the development of thyroiditis. Reparative processes after cessation of iodine administration have been followed; the thyroid returns to as normal a structure as possible, a colloid goiter.

AD-611 706 Div. 16

Army Medical Research and Nutrition Lab., Denver, Colo.
BILATERAL HERMAPHRODITISM IN A DOG,
by Norval W. King and Charles H. Garvin. 1964, p
Unclassified report

Pub. in Journal of the American Veterinary Medical Association. v145 n10 p997-1001 15 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Dogs, Reproductive system), (*Reproductive system, Anomalies), Sex, Sex glands, Chromosomes, Testes, Ovaries, Genetics, Surgical techniques, Histological techniques, Veterinary medicine.

Bilateral hermaphroditism was diagnosed in a 6-month-old Beagle. Histologically, bilateral ovotestes, epididymides, and fallopian tubes were identified. The dog also had a vagina, phallus, and bicornuate uterus. The dog was genetically a female as determined by the sex chromosomal pattern of its neutrophils. (Author)

AD-611 708 Div. 16

Puerto Rico Univ., San Juan.
EFFECT OF pH ON MOLLUSCICIDAL ACTIVITY OF BAYER 73 VS. Australorbis glabratus OF PUERTO RICO UNDER LABORATORY CONDITIONS,
by Irving Fox, Lawrence S. Ritchie, and Lyman P. Frick. 2 Jul 62, 6p
Grant PHS E3821
Unclassified report

Pub. in Experimental Parasitology (U. S.) v13 n2 p167-72 Apr 1963 (Copies not available to DDC or Clearinghouse customers).
Research supported in part by the World Health Organization and the Puerto Rico Department of Public Health.

Descriptors: (*Molluscacides, Toxicity), (*Gastropoda, Toxic tolerances), Salicylic acids, Organic nitrogen compounds, Water, pH.

A Laboratory strain of Australorbis glabratus of Puerto Rico when exposed for 24 hours in Bayer 73, 5-chlorosalicylic acid (2-chloro, 4-nitro) anilide, at 0.2 parts per million in aerated tap water (pH 7.0-8.2) invariably succumbs, 100% of the snails being killed. However, in test waters of high acidity (pH 4 and pH 5) and high alkalinity (pH 9.3-9.9) 4 to 8 times as much molluscicide or 0.8 to 1.6 ppm may be necessary to effect 100% mortality. Different kinds of water such as distilled, chlorinated tap, aerated tap, and the like, give markedly different mortality results in toxicological experiments in various laboratories throughout the world. This may be partly explained by the different qualities of the water, of which an important one is the pH. (Author)

AD-611 709 Div. 16

Army Medical Research and Nutrition Lab., Denver, Colo.
MULTIPLE NEOPLASIA IN A DOG,
by David G. Fairchild, John F. Ferrell, Charles L. Davis, and Charles H. Garvin. 1964, 6p
Unclassified report

Pub. in the Journal of the American Veterinary Medical Association. v145 n10 p991-96 15 Nov 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Dogs, Neoplasms), (*Cancer, Dogs), Veterinary medicine, Pathology, Medical examination, Histological techniques.

An 8-year-old male Bulldog had been examined regularly for 3 months prior to death. In that time 3 surgically removed tumor masses were identified as 3 different primary neoplasms. Two of these tumors were histologically malignant. Necropsy findings included 2 metastases of the aforementioned tumors and 2 additional primary tumors. Histologically, the neoplasms were: (1) malignant melanoma of the cheek, with metastasis to the left parotid lymph node; (2) malignant mastocytoma of the hard palate, with metastasis to the right parotid and submaxillary lymph nodes; (3) basal cell carcinoma of the subcutis of the left hindlimb; (4) seminoma of the right testis; and (5) medulloblastoma of the right cerebral hemisphere. In addition to these tumors, 3 other abnormalities were noticed: absence of the right olfactory bulb and tract, enlarged prostate gland with fibrosis and cyst formation, and severe hemosiderosis of the liver. (Author)

AD-611 710 Div. 16

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
THERMAL AND METABOLIC RESPONSES OF THE GRAY JAY TO COLD STRESS,
by James H. Veghte. 1964, 18p AMRL-TR-64-92
Proj. 7164, Task 716409
Unclassified report

Pub in Physiological Zoology (U. S.) v37 n3 p316-28 Jul 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Birds, Stress (Physiology)), Adaptation (Physiology), Metabolism, Body temperature, Oxygen consumption, Tissues (Biology), Heat production (Biology), Diurnal variations, Atmospheric temperature, Least squares method, Alaska.

The thermal and metabolic responses of the gray jay, Perisoreus canadensis pacificus (Gmelin), were determined over a temperature range from 25 to -50C during a 4-hour period for 12 consecutive months. A continually decreasing cold stress proved to be experimentally appropriate when compared to a step-function procedure. There were significant monthly differences in the oxygen consumption of the birds at ambient temperatures below -4C. The average annual resting metabolic rate of the jays was 1.75 ±0.31 S. D. cc O2/gm hr STP (51) or 14.05 kcal/bird-day. This value is the same as the theoretical value calculated by King and Farner's (1961) equation for small birds. There was a seasonal shift of the lower critical temperature. Critical temperature is not a discrete point but covers a range of temperatures and is best shown by an exponential curve. For an approximation, the usual least-squares technique for determining critical temperature is adequate. The Scholander method for determining critical temperature was not valid for all seasons. Temperature coefficients showed a seasonal variation from a high of 0.05 cc O2/gm hr for every degree decrease in ambient temperature during the winter and spring to 0.03 cc O2/gm hr for every degree decrease in the summer. Tissue and total insulation varied with the seasons. The diurnal variation of the cloacal temperature of the jays was 1.5C in the summer and 2.5C in the winter, requiring a high heat production during the long winter nights. (Author)

AD-611 711 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
MORPHOLOGIC ANALYSIS IN PATHOLOGY: THE KINETICS OF DISEASE AND GENERAL BIOLOGY OF BONE,
by Lent C. Johnson. 1964, 114p
Unclassified report

Pub. in mono. Bone Biodynamics, Boston, 1964, p543-654 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Morphology (Biology), Pathology), (*Bone, Pathology), Diseases, Necrosis, Regeneration, Cells (Biology), Bone marrow, Histological techniques, Diagnosis, Growth, Blood circulation, Calcification, Metabolism.

AD-611 712 Div. 16

SEATO Medical Research Lab., Bangkok (Thailand).
TYPES AND DISTRIBUTION OF ENTEROPATHOGENIC ESCHERICHIA COLI IN BANGKOK, THAILAND,
by Sidney Gaines, Yupin Achavasmith, Malinee Thareesawat, and Chiraphun Duangmani.
22 Jul 64, 7p
Unclassified report

Pub. in American Journal of Hygiene (U. S.) v80 n3 p388-94 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Escherichia coli, Thailand), Enterobacteriaceae, Diarrhea, Culture media, Diseases, Infants, Pathology.

Surveys of 2,670 patients with acute diarrhea and 1,500 normal, healthy individuals in Bangkok, Thailand, indicate that enteropathogenic Escherichia coli are significant in diarrheal diseases of infants in that country. During the 16 months of this study, approximately 10 per cent of the diarrhea in children under 2 years of age was due to these organisms. Serotypes 025:B19:B23, 0119:B14 and 0128:B12 were the most frequently found strains both in patients and in symptomless individuals. Serotypes 0111:B4 and 055:B5, among the most common serotypes in many parts of the world, were encountered rarely. Of 183 E. coli isolated from patients, 055:B5 was cultured 5 times and 0111:B4 was found in a single instance. Neither was obtained from normal, healthy subjects. (Author)

AD-611 713 Div. 16

SEATO Medical Research Lab., Bangkok (Thailand).
ORNITHONYSSUS BACOTI (HIRST) INFESTATION IN MOUSE AND HAMSTER COLONIES,
by Thomas J. Keefe, John E. Scanlon, and Lenly D. Wetherald. 1964, 4p
Unclassified report

Pub. in Laboratory Animal Care (U. S.) v14 n5 p366-9 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Laboratory animals, Mites), (*Mites, Pest control), Mice, Hamsters, DDT, Insecticides, Tropical regions, Reproduction (Physiology), Thailand.

Infestation with Ornithonyssus bacoti, the tropical rat mite, occurred in mouse colonies and a hamster colony in

Bangkok, Thailand. The infestation in mouse colonies was extensive, affecting most of the animals. In the hamster colony, only occasional cage mates were infested. Following infestation of colony mice, there was a marked decline in production of litters in affected colonies. Treatment of mouse quarters and cages with DDT, coupled with dusting of mice with a silica aerogel insecticide did not control the spread of mites. Infestation in the animal colonies was eradicated effectively by the repeated application of malathion compounds to mice and quarters. Following and during the time malathion compounds were applied, the productivity of the mouse colony returned to the lower limits of the previous normal levels. (Author)

AD-611 716 Div. 16

Johns Hopkins Univ., Baltimore, Md. School of Hygiene and Public Health.
STUDIES OF STORAGE DISEASE GLYCOGENS,
by Ernest Bueding, Stanley A. Orrell, Jr., and James Sidbury. 1964, 7p
Contract Nonr341700; Grant NIH HEO5268
Unclassified report

Pub. in mono. Ciba Foundation Symposium on Control of Glycogen Metabolism, London, p387-92 1964 (Copies available only to DDC users).
Research done in cooperation with Duke Univ., Durham, N. C.

Descriptors: (*Glycogen, Pathology), Liver, Water, Mammals, Muscles, Humans, Glucose, Phosphoric monoester hydrolases, Molecular weight, Bases (Chemistry).

When the cold-water extraction procedure (AD-611 717) is used, characteristic differences in the sedimentation coefficient distributions are readily apparent for glycogens obtained from liver biopsy samples of patients with various types of glycogen storage disease. Cold water-extracted glycogen samples from cases with phosphorylase deficiency are characterized by a marked separation of the two peaks, a prominent light peak and extreme polydispersity. In the case of glucose 6-phosphatase deficiency, the peaks are of approximately equal height, are less well separated from each other, and the samples also are very polydisperse. Samples from generalized glycogen storage disease exhibit less polydispersity, only a very small second peak, and a much lower average molecular weight. These studies of storage disease glycogens have revealed that, in contrast to mammalian muscle glycogens, the sedimentation coefficient distributions of cold water-extracted liver glycogens are determined to a considerable degree by physiopathological factors.

AD-611 717 Div. 16

Johns Hopkins Univ., Baltimore, Md. School of Hygiene and Public Health.
PHYSICAL CHARACTERISTICS OF UNDEGRADED GLYCOGEN,
by Stanley A. Orrell, Jr., Ernest Bueding, and Magdalena Reissig. 1963, 17p
Contract Nonr341700; Grant NIH HE05268
Unclassified report

Pub. in mono. Ciba Foundation Symposium on Control of Glycogen Metabolism, London, p29-44 1964 (Copies available only to DDC users).

Descriptors: (*Glycogen, Physical properties), Bases (Chemistry), Water, Separation, Molecular weight, Ascaris, Rabbits, Liver, Trematodes, Platyhelminths.

An attempt has been made to isolate glycogen from various tissues in quantitative yields by means of a cold-water extraction procedure and to obtain some information about the properties of this material. The isolation procedure was based in part on the observation that treatment of aqueous solutions of proteins and polysaccharides with certain organic solvents, e.g., chloroform or a mixture of chloroform and octyl alcohol, results in the precipitation of proteins at the interphase, while polysaccharides remain in the aqueous phase. The molecular weight distributions of undergraded glycogens exhibit a considerable degree of specificity for a given species, tissue, and physiological state. The more drastic procedures of isolation result in a degradation of the glycogen molecule to such an extent that these distinctive characteristics are completely lost. On the other hand, it would appear that the milder and quantitative procedure of extraction, using cold water, yields a product which approaches more closely the state of glycogen in the living cell.

AD-611 719 Div. 16

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
MEASUREMENT OF THE DISPLACEMENTS AND NONLINEARITIES OF THE GUINEA-PIG TYMPANUM.
Final rept. for Mar 62-Jul 64,
by Lothar O. Hoeft, Eugene Ackerman, and Adam Anthony. 1 Aug 63, 13p Rept. no. AMRL TR-65-20
Proj 7232, Task 723204
Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n10 p1836-44 Oct 1964 (Copies not available to DDC or Clearinghouse customers), Paper presented to the Meeting of the Acoustical Society of America (62nd) held at Cincinnati, Ohio, 10 Nov 61.

Descriptors: (*Ear, Acoustic properties), (*Acoustic properties, Ear), Guinea pigs, Biophysics, Acoustic impedance, Nonlinear systems, Functions, Frequency, Pressure, Elasticity, Sensitivity, Hysteresis, Measurement.

Direct measurements were made of the displacement of the guinea-pig eardrum when acted upon by acoustic pressures (200-6000 cps). The mechanical nonlinearities of the ear were studied by introducing a static pressure (0 to ±3000 dyn/ square cm) in the middle-ear cavity. Below 1000 cps, the ratio of the tympanum displacement to the sound pressure was frequency-independent, with a value of about 4X10 to the minus 7th power cc/dyn. Above 1000 cps, this ratio exhibited a series of maxima and minima. A static-pressure difference across the typanum changed the frequency at which the maximum occurred and generally decreased the displacement/pressure ratio. It was concluded (1) for low frequencies, the lumped-parameter description of the ear as a cavity was valid; (2) the tympanum acts as a flexible, conical plate under slight tension; (3) the measurements were best explained in terms of two nonlinearities: hysteresis and a nonlinearity of the elastic properties of the ear. (Author)

AD-611 720 Div. 16

Walter Reed Army Medical Center, Washington, D. C.
CARPAL TUNNEL SYNDROME AS MANIFESTATION OF SARCOIDOSIS,
by George E. Shambaugh, William J. Cirksena, and Kermit L. Newcomer. 30 Jun 64, 4p
Unclassified report

Pub. in Archives of Internal Medicine (U. S.) v114 p830-3 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hands, Pathology), Bone, Nerves, Muscles, Diseases, Etiology, Joints (Physiology), Histology, Diagnosis, Medical examination.

Two patients with bilateral carpal tunnel syndrome are reported. One had coeistent psoriasis raising the question as to the etiology of his joint, muscle, and carpal tunnel manifestations. The other had mild diabetes mellitus. In both, evidence favored the relationship of the carpal tunnel syndrome to sarcoidosis. Hilar lymph node enlargement was absent in both patients, but liver biopsy disclosed a granulomatous hepatitis. Synovial biopsy at the time of exploration of the carpal tunnel showed only nonspecific changes without granulomata. (Author)

AD-611 732 Div. 16

Cornell Univ., Ithaca, N. Y.
RESPIRATION DURING PHOTOSYNTHESIS,
by Herbert V. Marsh, Jr., Jean M. Galmiche, and Martin Gibbs. 1964, 13p
Contract AF49 638 798
AFOSR 65-0359

Unclassified report

Pub. in Record of Chemical Progress (U. S.) v25 n4 p259-71 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Respiration, Photosynthesis), (*Photosynthesis, Respiration), Chlorophylls, Illumination, Coenzymes, Saccharide phosphates, Adenosine phosphates, Inhibition, Light, Algae, Metabolism, Amino acids, Carboxylic acids, Aspartic acids, Labeled substances, Radioactive isotopes.

An attempt was made to determine the effect of light on the operation of the tricarboxylic acid cycle in a green alga. Scenedesmus obliquus was incubated with acetate-1-C14, acetate-2-C14 or pyruvate-3-C14. Citrate, alpha-ketoglutarate, malate, succinate, and glutamate were isolated and degraded. Aspartate was isolated but not degraded. Sufficient cells were used to obtain specific activity values for each compound without the addition of unlabeled carrier. A classical Krebs cycle is present in these cells. While light decreases the amount of acetate and pyruvate from entering the cycle by increasing lipid synthesis, light has no detectable effect on the turnover of the intermediates of the cycle. Acetate apparently entered the cycle exclusively as acetyl-CoA. This compound is apparently a port of entry into the cycle for pyruvate but in the light there is superimposed a carboxylation of pyruvate to malate. The malic acid formed in the light is not in complete equilibrium with other intermediates of the citric acid cycle. The metabolism of aspartic acid differs in the light and dark. Contrary to previous reports, glutamic acid derives solely from the tricarboxylic acid cycle. (Author)

AD-611 736 Div. 16

Brussels Univ. (Belgium).
STUDY OF THE BIOCHEMICAL EFFECTS OF BETA-MERCAPTOETHANOL ON THE EGGS OF BATRACHIANS (Etude des Effets Biochimiques du Beta-Mercaptoethanol sur les oeufs de Batraciens),
by J. Brachet, M. Cape, M. Decroly, J. Quertier, and N. Six. 1 Mar 61, 21p
Contract AF61 052 356
AFOSR 2175

Unclassified report

Pub. in Developmental Biology (U. S.) v3 n4 p424-43 Aug 1961 (Copies not available to DDC or Clearinghouse customers).
Document in French.

Descriptors: (*Amphibians, Eggs), (*Thiols, Mitosis), Biochemistry, Alcohols, Proteins, Synthesis, Morphology (Biology), Autoradiography, Oxidation, Embryos, Oxygen consumption, Adenosine phosphates, Desoxyribonucleic acids, Nucleic acids, Belgium.

The biochemistry of amphibian eggs treated with mercaptoethanol (M/100) under conditions which completely inhibit morphogenesis was studied. It was found that: (1) Mercaptoethanol undergoes a fairly rapid oxidation under the experimental conditions. (2) The acid-soluble --SH groups content increases in mercaptoethanol-treated embryos. (3) Treatment with mercaptoethanol leads to a moderate decrease in the oxygen consumption and has no marked effect on the ATP content. (4) The block in development induced by mercaptoethanol cannot be explained on the basis of a stimulation of catheptic activity. (5) Mercaptoethanol does not immediately inhibit the incorporation of thymidine into DNA, of uridine into nuclear nucleic acids, and of leucine into the proteins of the treated embryos. Inhibition of nucleic acid and protein synthesis can be observed when the effects of mercaptoethanol on morphogenesis become irreversible. The significance of these results is discussed. (Author)

AD-611 737 Div. 16

Brussels Univ. (Belgium).
SOME EFFECTS OF BETA-MERCAPTOETHANOL AND OF DITHIODIGLYCOL ON REGENERATION (Quelques Effets du Beta-Mercaptoethanol et du dithiodiglycol sur la Regeneration),
by F. Descotils-Heernu, J. Quertier, and J. Brachet. 9 Jan 61, 20p
Contract AF61 052 356
AFOSR 2174

Unclassified report

Pub. in Developmental Biology (U. S.) v3 n3 p277-96 Jun 1961 (Copies available only to DDC users).
Document in French.

Descriptors: (*Thiols, Regeneration), (*Regeneration, Tissues (Biology)), Alcohols, Animals, Mitosis, Cells (Biology), Inhibition, Ribonucleic acids, Desoxyribonucleic acids, Synthesis, Belgium.

The effects of beta-mercaptoethanol and dithiodiglycol (the former containing an -SH group and the latter an -SS-group) on regeneration have been studied in five animal species. Mercaptoethanol inhibits regeneration while dithiodiglycol (at those concentrations at which it can be employed) has almost no effect. Mercaptoethyl gluconamide, a derivate of mercaptoethanol, cannot penetrate into the cells and it has no noticable influence on regeneration, except at extremely high concentrations. Mercaptoethanol moderately reduces mitotic activity and basophilia in the blastema. However, it stimulates the synthesis of RNA without acting on DNA synthesis. Dithiodiglycol does not modify mitotic activity, but it increases slightly the basophilia of the regenerating tissue. It also stimulates RNA synthesis. (Author)

AD-611 761 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Cornell Univ., Ithaca, N. Y.
STUDY OF THE PHYSIOLOGICAL CHEMICAL MECHANISMS OF THE TOXIC ACTION OF HYDRAZINES.
Quarterly rept. no. 2, 1 Oct-31 Dec 62,
by R. D. O'Brien. 31 Dec 62, 11p
Contract DA18 108CML7209 Unclassified report

Descriptors: (*Hydrazine, Toxicity), (*Hydrazine derivatives, Toxicity), Carbohydrates, Metabolism, Brain, Biochemistry, Rats, Poisoning, Convulsive disorders, Vitamin B complex, Glycolysis, Lactates, Lethal dosages.

The first four months of work have established procedures and also for the rat (1) provided symptomological evidence that hydrazine has a different mode of action from unsymmetrical dimethylhydrazine (UDMH) or monomethylhydrazine, (2) established LD50's with and without pyridoxine, (3) shown that UDMH and hydrazine stimulate respiration and inhibit glycolysis when brain slices from normal and poisoned rats are compared, (4) shown a profound (e.g. 95%) reduction in brain lactate by UDMH and hydrazine.

AD-611 769 Div. 16
CFSTI Prices: HC$4.00 MF$1.00

Engineering-Science, Inc., Arcadia, Calif.
POSTATTACK SANITATION WASTE DISPOSAL, PEST AND VECTOR CONTROL REQUIREMENTS AND PROCEDURES.
Feb 65, 123p
Contract OCD PS64 9, Task 3441A Unclassified report

Descriptors: (*Infectious diseases, Control), (*Disease vectors, Control), (*Pest control, Public health), (*Wastes (Sanitary engineering), Disposal), Gastrointestinal system, Bacteria, Enterobacteriaceae, Parasitic diseases, Rickettsia, Rodents, Culicidae, Diptera, Diseases, Shelters, Nuclear explosions, Explosion effects, Ecology, Climatology, Geography, United States, Population, Sanitary engineering, Passive defense.

In the event of a nuclear attack on the United States, environmental disease control measures will be interrupted with the surviving population exposed to the ensuing disease hazards. The report considers the probability of the occurrence of some 14 diseases that might develop, evaluates the effectiveness of available control measures and determines the total operational requirement for recovery of environmental sanitation in terms of manpower, equipment and material. The enteric infections (Shigellosis, Infectious Hepatitus, Salmonellosis, Typhoid and Amoebiasis), especially Shigellosis (bacillary dysentery), are assigned a leading role among the diseases to be controlled, thus indicating a compelling need for the prompt removal and sanitary disposal of human feces and of spoiled food and other decomposable fly breeding potential organic material. Other hazards include mosquito-borne encephalitis, Rabies, Murine Typhus, Plague, Leptospirosis, Rocky Mountain Spotted Fever, Dengue, Malaria and Yellow Fever. Significantly effective control of these disease hazards in the postattack environment is possible through the utilization of material and equipment properly positioned for prompt postattack operations. The magnitude of these needs (material, equipment and manpower) is developed for an estimated metropolitan population of 88 million.

AD-611 773 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center,
Redstone Arsenal, Ala.

THE EFFECT OF PULSATING LIGHT SOURCES ON THE ELECTRICAL ACTIVITY OF THE HUMAN BRAIN,
by V. A. Il'yanok and V. G. Samsonova.
Feb 65, 13p RSIC-298
TT 65-61790 Unclassified report

Trans. of Svetotekhnika (USSR) 1963, v. 9, no. 5, p. 1-5.

Descriptors: (*Photosensitivity (Biological), Brain), (*Brain, Photosensitivity (Biological)), Light, Stimulation, Electroencephalography, Nerve cells, Nervous system, Fatigue (Physiology), Frequency, Intensity, Luminescence, Oscillation, Vision, USSR.

Assimilation by the brain of high frequencies of light pulsations is observed even during pulsations having a depth that would occur under normal conditions of lighting by luminiscent lamps and when no measures are undertaken to lower the depths of oscillations of the light flow. It is assumed that a prolonged reproduction by the brain of high frequencies of pulsating light, as well as of two or three rhythms of light flashes differing in frequency, may cause fatigue of the brain's nervous system induced by prolonged functioning in a relatively unnatural rhythm of nervous activity. The following conclusions are drawn: (1) When luminescent lamps with a frequency of 100 cps are switched on, it is desirable to use an arrangement in which the depths of pulsations not to exceed 5 - 8%, may be assured. (2) During pulsation frequencies of 300 cps and higher in the light flow, the depth of pulsations is of no consequence since the human brain is not responsive to such a frequency. (3) Experiments on the changes in the durations of light flashes illustrate the expediency of using long-lag luminophors, in luminescent lamps.

AD-611 805 Div. 16
CFSTI Prices: HC$2.00 MF$0.50

Institute of Occupational Health, Helsinki (Finland).
Dept. of Physiology.
TEMPERATURE OF THE HUMAN BODY DURING RAPID ALTERNATE HEATING AND COOLING.
Final rept. for May 63-Apr 64,
by Pekka Piironen and Erkki Aikas. Dec 64, 37p
Grant AF EOAR63 113, Proj. 7164, Task 716409
AMRL TR64 131 Unclassified report

Descriptors: (*Body, Temperature control), (*Body temperature, Stress (Physiology)), Cooling, Heating, Heat transfer, Thermal stresses, Surface temperature, Heat tolerance, Tolerances (Physiology), Environmental tests.

Eight nude resting male subjects were immersed in water. The temperature of the bath was varied cyclically from -5 to 42C. Similar experiments were performed in air with temperatures varying from -5 to 120C. Skin temperatures oscillated sinusoidally with amplitudes varying from 1 to 10C and periods varying from 3.75 to 30 minutes. Variations in skin temperature below 30C did not affect the oesophageal temperature. Sinusoidal variations in skin temperature above 34C were reflected in nearly sinusoidal alterations in the oesophageal temperature. Sinusoidal variations in oesophageal temperature were accompanied by nearly sinusoidal alterations in rectal, sublingual and tympanic membrane temperatures, with damping characteristics and phase shifts typical for each site of measurement. (Author)

AD-611 818 Div. 16, 30
CFSTI Prices: HC$4.00 MF$1.00

RAND Corp., Santa Monica, Calif.

FLUID BALANCE AND ELECTROLYTE DISTRIBUTION IN THE HUMAN BODY,
by Edward C. DeLand and Gilbert Bradham.
Feb 65, 121p Rept. no. RM-4347-PR
Contract AF49 638 700

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Body fluids, Mathematical models), (*Electrolytes (Physiology), Mathematical models), Anatomical models, Moles, Electrochemistry, Blood plasma, Erythrocytes, Permeability, Carbon dioxide, Stress (Physiology), Programming (Computers), Tables.

A conceptual model and a mathematical method are presented for computing the physiological fluid and electrolyte distribution for selected body compartments of an average, young, 70-kilogram human male. The mathematical procedure simulates the physiological subsystems by incorporating all the known chemical reactions and electrochemical relations which seem necessary to establish the fluid and electrolyte distribution. Because the whole body is being considered, the relatively large number of computations required argues that a computer be employed. The construction of the model and the mathematical background is given in heuristic form only, with reference to earlier papers for rigorous development. Considerable detail is shown regarding the analysis of the computed results for a standard, steady-state, average, young, resting, 70-kg human male. The results of validation experiments, consisting of chemical stresses applied to the model, are discussed.

AD-611 854 Div. 16
CFSTI Prices: HC$2.00 MF$0.50

Maryland Univ., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE, VOLUME IV, NO. 2,
ed. by George Anastos. 1965, 28p
Contract DA49 193MD2238
TT 65-61793

Unclassified report

Descriptors: (*Bibliographies, Disease vectors), (*Disease vectors, Bibliographies), (*Insects, Bibliographies), Ticks, Mites, Diptera, Siphonaptera, Lice, Coleoptera, Rickettsia, Bacteria, Spirochaeta, Parasites, Protozoa, Viruses, Toxicity, Ecology, Epidemiology, USSR, Eastern Europe, China.

AD-611 860 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT THE ONES WHO REMAIN ON EARTH,
by O. Gazenko. 1 Mar 65, 17p FTD-TT-64-920
TT 65-61797

Unclassified report

Unedited rough draft trans. of Nauka i Zhizn' (USSR) 1964, v. 31, no. 1, p. 26-31.

Descriptors: (*Space medicine, USSR), Protective clothing, Pressure suits, Breathing apparatus, Pressure breathing, Resperation, Environmental tests, Simulation, Space environmental conditions, Tolerances (Physiology), Aviation medicine.

A popularized article on the development of space medicine in the USSR is presented.

AD-611 881 Div. 16, 28

Office of Aviation Medicine, Federal Aviation Agency, Washington, D. C.
THE PHYSIOLOGICAL LOCUS OF THE SPIRAL AFTER-EFFECT,
by Sheldon L. Freud. 11 Jul 62, 9p
Rept. no. AM-64-17

Unclassified report

Pub. in American Journal of Psychology (U.S.) v77 p422-8 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Vision, Afterimages), (*Retina, Afterimages), (*Afterimages, Retina), Illusions, Central nervous system, Physiology.

AD-611 882 Div. 16

Georgetown Univ. Hospital, Washington, D. C.
THE RECOGNITION OF STRICTLY POSTERIOR MYOCARDIAL INFARCTION BY CONVENTIONAL SCALAR ELECTROCARDIOGRAPHY,
by Joseph K. Perloff. 1964, 15p
Grant PHS HE08390
AM 64-19

Unclassified report

Pub. in Circulation (U. S.) v30 p706-18 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cardiovascular diseases, Electrocardiography), (*Electrocardiography, Cardiovascular diseases), Heart, Diagnosis, Medical examination, Pathology.

This study was undertaken in order to determine whether the standard scalar electrocardiogram contains sufficient information to permit the recognition of strictly posterior myocardial infarction. Sixteen patients were selected on the basis of vectorcardiographic evidence and four on the basis of autopsy evidence. One hundred normal adult electrocardiograms served as controls. The data indicate that strictly posterior infarction causes (1) R waves of 0.04 second in V sub 1 and in contiguous right anterior chest leads with upright T waves and, in the acute phase, ST-segment depressions, (2) Q waves of 0.04 second in an area posteriorly between the spine and the left scapula, (3) R/S ratios equal to or greater than on in V sub 1 and V sub 2, (4) slurring of the descending limb of the R wave in lead V sub 1 due to abrupt change in QRS direction, and (5) no pathologic Q waves in the standard 12 leads unless diaphragmatic or lateral infarction coexists. Extra chest leads derived from the right anterior and left posterior thorax serve principally to corroborate the diagnoses. R waves of 0.04 second or R/S ratios equal to or greater than one in lead V sub 1 were also found in the normal child, complete right bundlebranch block, the Wolff-Parkinson-White syndrome with an anteriorly directed delta wave, right ventricular hypertrophy, and an occasional normal adult especially with vertical frontal plane electrical axis. (Author)

AD-611 883 Div. 16, 33

Federal Aviation Agency, Washington, D. C. Medical Standards Div.
MEDICAL SERVICES AT AIRPORTS,
by Homer L. Reighard. 9 Mar 62, 16p
AM 65-3

Unclassified report

Pub. in Archives of Environmental Health (U. S.) v5

p344-57 Oct 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Airports, Hospitals), (*Hospitals, Airports), Aviation medicine.

This is a report of a study to determine (1) the nature and extent of medical service desirable at large airports; (2) the manner in which such services are now met, and (3) the means by which these services might be provided in a more effective and comprehensive manner. The study was made at one civil airport reasonably representative of other large municipal airports. Attention to was given to 2 other considerations: (1) the possible medical contributions to air safety, especially those which are, or might be, achieved through medical service to airport populations, and (2) the possible role of airport medical services in correcting the general lack of available facilities for the supervised practice of aviation medicine by civilian physicians. (Author)

AD-611 884 Div. 16

Georgetown Univ. Hospital, Washington, D. C.
CRANIAL IMPEDANCE PLETHYSMOGRAPHY, RHEOENCEPHALOGRAPHY AS A METHOD OF DETECTION OF CEREBROVASCULAR DISEASE,
by J. H. Seipel, S. A. R. Ziemnowicz, and D. S. O'Doherty. 1962, 21p
AM 65-4
Unclassified report

Pub. in mono. Cerebral Ischemia, Springfield, n. d., p162-80 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Brain, Blood circulation), Blood vessels, Diseases, Pathology, Nerve cells, Blood volume, Diagnosis, Thrombosis, Anticoagulants, Obstruction (Physiology), Medical equipment.

Rheoencephalography, the monitoring of cerebral blood flow by impedance methods, has been used successfully in clinical medicine in Europe and Russia but not in the United States. Three cases are presented to demonstrate the potential value of this method in the diagnosis of cerebrovascular pathology. These cases also demonstrate that the method appears to monitor intracranial circulation in humans. The first case of the 'subclavian steal' syndrome second to any extravascular occlusion disease is presented. (Author)

AD-611 886 Div. 16, 4

Naval Medical Research Inst., Bethesda, Md.
BINDING OF BROMOCRESOL GREEN BY HUMAN SERUM ALBUMEN.
Rept. no. 6,
by F. Lee Rodkey. 27 Jul 64, 5p
Proj. MR005 02 0011 01
Unclassified report

Pub. in Archives of Biochemistry and Biophysics v108 n3 p510-3 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Chemical indicators, Molecular association), (*Serum albumen, Chemical indicators), Ions, pH, Absorption spectrum, Thiols.

Binding of bromocresol green by a purified deionized preparation of human mercaptalbumin has been studied by spectrophotometry and ultrafiltration. Intense binding was observed at pH values below 5 where both nonspecific electrostatic as well as specific anionic binding may be involved. Binding of the bivalent anion of bromocresol green was measured at pH = 6.95 over a 300-fold range of free indicator concentration. The data are interpreted in terms of two classes of binding sites. Three molecules of indicator are bound per molecule of albumin with an association constant k' = 700000. Five additional molecules are bound less tightly, k'' = 20000. Similar results were obtained with three types of human albumin preparations obtained commercially. Bovine albumin has a somewhat lower affinity for bromocresol green than has human albumin. (Author)

AD-611 887 Div. 16, 4

Naval Medical Research Inst., Bethesda, Md.
INTERACTIONS OF ARYL ESTERS IN THE TROPINE AND PSI-TROPINE SERIES WITH TISSUE CHEMORECEPTORS. THE ORTHO EFFECT. VII.
Rept. no. 34,
by S. L. Friess, L. J. Reber, R. C. Durant, H. D. Baldridge, Jr., and C. H. Allen. 27 Jan 64, 15p
Proj. MR005 06 0010 01
Unclassified report

Pub. in Toxicology and Applied Pharmacology (U. S.) v6 n6 p676-89 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Alkaloids, Toxicity), (*N-heterocyclic compounds, Toxicity), (*Stereochemistry, N-heterocyclic compounds), (*Chemoreceptors, Poisoning), Amines, Esters, Alcohols, Acetates, Synthesis (Chemistry), Mice, Cats, Toxic tolerences, Neuromuscular transmission, Catalysis, Acetylcholenesterase.

Studies on toxic properties of substituted phenylacetic esters in the tropine and psi-tropine amino alcohol series have revealed a subtle 'ortho effect' in ester-chemoreceptor interactions. Receptors in the isolated rat phrenic nerve-diaphragm preparation and at the catalytic locus on acetylcholinesterase are quite sensitive to tropine vs. psi-tropine configurations in esters bearing ortho, meta, or para substituents on the phenyl nucleus. In contrast, receptors mediating convulsive death in the mouse are fully as sensitive to ring stereochemistry in esters bearing m- or p-substituents, but lose their ability to discriminate between tropine and psi-tropine structure when the phenyl group is substituted in ortho position. This latter finding is independent of the electronic character of the substituent in ortho position, but appears to be related to a requirement for a certain minimum steric bulk of that substituent. These results are interpreted in terms of possible modes of attachment of the aryl esters to central and peripheral chemoreceptor surfaces. (Author)

AD-611 890 Div. 16, 28

Walter Reed Army Inst. of Research, Washington, D. C.
TIMED BEHAVIOR IN PRIMATES DURING VARIOUS EXPERIMENTAL UREMIC STATES,
by Gerald P. Murphy and Joseph C. Sharp.
10 Jun 64, 4p
Unclassified report

Pub. in Journal of Surgical Research (U. S.) v4 n12 p550-3 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Blood chemistry, Behavior), Blood diseases, Urea, Urine, Kidneys, Monkeys, Performance tests, Blood plasma, Electrolytes (Physiology), Osmosis, Ph.

The influence of various experimental uremic states

upon a complex behavioral schedule employing conditioned paced avoidance was studied in primates. Alterations in behavior were comparable in the presence of bilateral ureteral ligation, nephrectomy, continuous urine reinfusion or urea infusion. Performance decrements, however, occurred at different times in relation to different levels of plasma urea nitrogen concentration. Performance decrements during urine reinfusion were reversible and were noted at PUN levels of 59 mg. per 100 ml., whereas values of 183 to 257 mg. per 100 ml. were observed in the other experimental uremic states. Alterations in behavior were not related to abnormalities in plasma potassium, sodium or osmolarity; blood pH; the mechanics of infusion; or bacterial contamination. (Author)

AD-611 891 Div. 16

Walter Reed Army Inst. of Research, Washington, D.C.
FURTHER STUDIES ON THE DEVELOPMENT OF COMPLEMENT-FIXING ANTIBODIES AND PRECIPITINS IN HEALTHY HISTO-PLASMIN-SENSITIVE PERSONS FOLLOWING A SINGLE HISTO-PLASMIN SKIN TEST,
by Charlotte C. Campbell and Grace B. Hill. 19 May 64, 8p

Unclassified report

Pub. in American Review of Respiratory Diseases (U.S.) v90 n6 p927-34 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Antigens and antibodies, Diagnostic agents), (*Antigen-antibody reactions, Stimulation), Medical examination, Fungi, Diseases, Complement, Pathology, Histoplasma, Blastomyces, Coccidioides, Yeasts.

In a detailed study of 25 healthy laboratory workers, complement-fixation titers were increased from negative (<1:8) to as high as 1:256 in 7 of the 12 positive reactors following a single histoplasmin skin test. Agar gel diffusion tests converted from negative to positive in 9 of the 12. There is good evidence that the skin-test stimulatory factor is present in all lots of histoplasmin, although possibly in varying degrees, and also possibly in certain lots of the whole yeast phase antigen. Failure to recognize this factor in earlier studies has probably contributed to error in estimating the number of active cases of histoplasmosis in serologic surveys of populations and in the diagnosis of individual cases. There is danger that these errors will be further compounded with the increasing use of agar gel diffusion tests because, unlike the more complex complement-fixation test, this simple procedure can be performed in any laboratory with histoplasmin that is commercially available. To obviate continuation of this error, it is recommended that the histoplasmin skin test be used with greater discrimination in persons in whom serologic tests are to be done, that skin and serologic tests be used together as seldom as possible, and that the concentration of the skin-test stimulatory factor be predetermined for each lot of antigen before its use in serologic tests, as part of the standardization procedure. (Author)

AD-611 893 Div. 16

Western Reserve Univ., Cleveland, Ohio. School of Medicine.
EVIDENCE FOR A PRECURSOR IN VASOPRESSIN BIOSYNTHESIS,
by Howard Sachs and Yutaka Takabatake.
10 Jun 64, 7p
Grant AF AFOSR408 63
AFOSR 65-0302

Unclassified report

Pub. in Endocrinology (U. S.) v75 n6 p943-8 Dec 1964 (Copies not available to DDC or Clearinghouse customers). Research supported in part by National Institutes of Health, Washington, D. C.

Descriptors: (*Pituitary hormones, Biosynthesis), Labeled substances, Radioactive isotopes, Thalamus, Tissues (Biology), Tyrosine, Amino acids, Nerve cells, Antibiotics, Dogs.

Infusion of 35S-cysteine into the third ventricle of dogs for a period of 1.5 hr did not yield significant quantities of labeled vasopressin. However, animals sacrificed 4.5 hr after 1.5 hr of isotope infusion yielded 35S-vasopressin. If puromycin was administered from the start of the experiment, then labeling of vasopressin was not observed. Puromycin, administered after the isotope had been infused, did not prevent the subsequent appearance of labeled hormone either in vivo or with hypothalamic-median eminence (HME) slices incubated in vitro. The HME slices, in the presence of puromycin, gave rise to 35S- or 3H-vasopressin only if the in vitro incubation was preceded by the infusion of 35S-cysteine or 3H-tyrosine, respectively, into the third ventricle of a dog for 1.5 hr prior to sacrifice. It is suggested that the biosynthesis of vasopressin occurs via the intermediate formation of a precursor molecule which contains the hormone in a bound biologically inactive form. (Author)

AD-611 894 Div. 16

Western Reserve Univ., Cleveland, Ohio. School of Medicine.
VASOPRESSIN BIOSYNTHESIS. III. IN VITRO STUDIES,
by Yutaka Takabatake and Howard Sachs. 10 Jun 64, 11p
Grants AF AFOSR408 63, PHS AM02650 07
AFOSR 65-0301

Unclassified report

Pub. in Endocrinology (U. S.) v75 n6 p934-42 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pituitary hormones, Biosynthesis), Labeled substances, Radioactive isotopes, Thalamus, Tissues (Biology), Tyrosine, Amino acids, Nerve cells, Water, Guinea pigs.

Under appropriate conditions, the hypothalamo-neurohypophysial complex, removed intact from guinea pigs, incorporated 35S-cysteine or 3H-tyrosine into vasopressin and tissue proteins. The appearance of labeled hormone was time-dependent, required an energy source and was inhibited by puromycin. Whereas slices of hypothalamicmedian eminence (HME) tissue could also carry out the incorporation of isotopic amino acids into vasopressin in vitro, the distal portion of neuron (infundibular stem and process) could not do so. As in the case of in vivo isotope experiments, the appearance of labeled hormone in vitro was preceded by a lag period. This lag period appears to be a unique characteristic of vasopressin biosynthesis. Slices of HME taken from guinea pigs deprived of water for 4 days prior to sacrifice incorporated 2-5 times more label into vasopressin than slices of HME taken from animals which had free access to water. (Author)

AD-611 895 Div. 16

California Univ., Los Angeles. School of Medicine.
GLUCOCORTICOID-INDUCED DISAPPEARANCE OF LONG-ACTING THYROID STIMULATOR IN THE OPHTHALMOPATHY OF GRAVES' DISEASE,
by Norton J. Snyder, Donald E. Green, and David H. Solomon. 6 Apr 64, 7p
Contract Nonr23336; Grant PHS AM5035
Unclassified report

Pub. in Journal of Clinical Endocrinology and Metabolism (U. S.) v24 n11 p1129-35 Nov 1964 (Copies available to DDC or Clearinghouse customers).

Descriptors: (*Corticosteroid agents, Chemotherapy), (*Thyroid gland, Pathology), Ophthalmology, Diseases, Steroids, Biological assay, Pharmacology, Dosage, Inhibition, Adrenocorticotropic hormones.

The effect of glucocorticoid therapy on serum long-acting thyroid stimulator (LATS) was studied in 3 subjects. In a patient with severe ophthalmopathy and pretibial myxedema, prednisone treatment induced a clinical remission and disappearance of an initially high LATS titer. Ten days after discontinuance of prednisone, LATS was again detectable and the ophthalmopathy worsened. Reinstitution of prednisone again resulted in clinical improvement and in disappearance of LATS during the fourth week of therapy. In a second patient with ophthalmopathy, a similar response of LATS to steroid therapy was observed, though only transient improvement in ophthalmopathy occurred. In a third patient with similarly high titers of LATS, steroid therapy was without effect on the serum LATS or exophthalmos. The observation of a fall in LATS in the first 2 patients suggests that the response of Graves' ophthalmopathy to glucocorticoid therapy is not limited to an anti-inflammatory effect. The circumstances in these patients also indicate that great changes in LATS titer may occur while thyroid function is unaltered. (Author)

AD-611 896 Div. 16

California Univ., San Francisco. Medical Center.
CARDIOVASCULAR RESPONSES TO ICE-COLD SHOWERS,
by William R. Keatinge, Malcolm B. McIlroy, and Alan Goldfien. 10 Mar 64, 6p
Contract Nonr22255; Grant PHS HE06285
Unclassified report

Pub. in Journal of Applied Physiology (U. S.) v19 n6 p1145-50 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cardiovascular system, Stress (Physiology)), Blood pressure, Pulse rate, Autonomic nervous system, Reflexes, Blood vessels, Heart, Amines, Epinephrine, Levarterenol, Hypertension, Respiration.

A shower of ice-cold water (0-2.5 C) over the chest caused large increases in systolic and diastolic arterial pressures, pulse pressure, and pulse rate in normal subjects. Cardiac output rose by 59 and 100% in the two subjects in whom it was measured. The changes in pressure were considerably larger than those caused by a cold pressor test or by anxiety. The changes appear to be due to sympathetic nervous reflexes to the heart and blood vessels rather than release of adrenal catecholamines, as plasma epinephrine did not increase and plasma norepinephrine rose only by 0.32 micrograms/liter. Hyperventilation and evidence of peripheral venoconstriction occurred during the showers, but neither voluntary hyperventilation nor increased venous return from a change in posture produced the changes in blood pressure seen during showers. (Author)

AD-611 912 Div. 16

Illinois Univ., Urbana.
A NEW TYPE OF NEGATIVE PHOTOTROPOTAXIS OBSERVED IN A MARINE ISOPOD, EURYDICE,
by G. Fraenkel. 1961, 6p
Contract Nonr183407
Unclassified report

Pub. in Physiological Zoology (U. S.) v34 n3 p228-32 Jul 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Crustacea, Photosensitivity (Biological)), (*Photosensitivity (Biological), Crustacea), Aquatic animals, Light, Stimulation, Behavior.

The negative phototactic reactions of a marine isopod, Eurydice sp., have been described. In the presence of two lights shining from opposite ends of a long vessel they orient largely in a direction more or less at a right angle to the direction of the light rays, frequently disregarding differences in the relative intensity of the lights. This behavior is regarded as a somewhat aberrant case of tropotaxis in which a balance is struck not so much between the intensities as between the directions of the lights.

AD-611 913 Div. 16

Illinois Univ., Urbana.
RESISTANCE TO HIGH TEMPERATURES IN A MEDITERRANEAN SNAIL, LITTORINA NERITOIDES,
by G. Fraenkel. 1961, 4p
Contract Nonr183407
Unclassified report

Pub. in Ecology (U. S.) v42 n3 p604-06 Jul 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gastropoda, Heat tolerance), (*Heat tolerance, Gastropoda), Adaptation (Physiology), Aquatic animals, Invertebrates, Temperature, Mediterranean Sea.

The lethal high temperatures were determined for a Mediterranean littoral snail, Littorina neritoides L. which spends most of its life on rocks out of water. This snail resists 46 to 47C for 1 to 2 hours when submerged, and temperatures about 2 degrees higher when in air. A tolerance to such high temperatures has apparently never been recorded before in a marine invetebrate under comparable conditions. This is considered as a case of an extraordinary temperature adaptation in an organism which is habitually exposed to high temperatures.

AD-611 916 Div. 16

Johns Hopkins Univ., Baltimore, Md.
EFFECT OF RESPIRATORY GASES ON COMPLIANCE OF INTRAPULMONARY ARTERIES AND VEINS,
by E. S. Salem, S. Permutt, R. L. Riley, and J. W. C. Johnson. 16 Oct 64, 6p
Contract AF41 657 388; Grant NIH AP00208,

Proj. NR112 101

Unclassified report

Pub. in Journal of Applied Physiology (U. S.) v19 n6 p1202-6 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Respiratory system, Blood vessels), (*Blood volume, Respiratory system), (*Respiration, Blood circulation), Pressure, Lungs, Carbon dioxide, Oxygen, Nitrogen, Diffusion.

A method was developed that permitted changes in the pressure-volume characteristics of large intrapulmonary vessels occurring with changes in the composition of alveolar gas to be studied in excised lungs. The capillary bed was emptied by keeping intravascular pressure well below alveolar pressure, and the relationship between changes in the volume of the pulmonary arteries or veins with changes in transpulmonary pressure was measured. The volume of the arteries and veins always decreased with a decrease in transpulmonary pressure, but when the alveoli contained carbon dioxide, the decrease in vascular volume was less, for the same decrease in transpulmonary pressure, than when the alveoli contained oxygen or nitrogen without carbon dioxide. This change with carbon dioxide was probably due to a decrease in the compliance of the larger intrapulmonary arteries and veins. Since there was no pathway for carbon dioxide to enter these vessels except by diffusion from the alveoli, it is concluded that carbon dioxide can act directly on the intrapulmonary arteries and veins to reduce their compliance, but it is not known whether this effect has physiological significance. (Author)

AD-611 922 Div. 16

New York State Psychiatric Inst., N. Y.
RNA POLYMERASE IN THE CENTRAL NERVOUS SYSTEM,
by S. C. Bondy and H. Waelsch. 18 May 64, 5p
Grant AF AFOSR443 63
AFOSR 65-0303

Unclassified report

Pub. in Life Sciences (U. S.) v3 n6 p633-36 1964 (Copies not available to DDC or Clearinghouse Customers).

Descriptors: (*Ribonucleic acid, Enzymes), (*Enzymes, Central nervous system), (*Central nervous system, Enzymes), Polymerization, Brain, Cerebral cortex, Liver, Nuclei (Biology).

RNA polymerase in cerebral cortex is higher than in other regions of the rabbit brain. The average activity of the brain nuclei is higher than that of the liver nuclei. During development, the activity of RNA polymerase increases with maturation. (Author)

AD-611 937 Div. 16

Texas Univ., Galveston. Medical Branch.
STUDIES ON TRYPANOSOMA GAMBIENSE INFECTION IN VARIOUS SPECIES OF EXPERIMENTAL ANIMALS,
by Ardzroony Packchanian. 8 Jul 64, 9p
Grant NSF14253

Unclassified report

Pub. in Texas Reports on Biology and Medicine (U. S.) v22 n4 p707-15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Trypanosoma, Infections), (*Rodents, Trypanosoma), Diseases, Injection (Medicine), Laboratory animals, Parasites, Disease vectors, Experimental data, Maintainability.

Experimental Trypanosoma gambiense infection in 19 species and subspecies of rodents was investigated with special reference to the susceptibility or resistance of each species of rodent to a virulent strain of T. gambiense. Eight species and subspecies of rodents contracted acute trypanosomiasis and died within a week. In seven species and subspecies of rodents, T. gambiense infection ran a subacute to chronic course. The control animals, Mus musculus and Rattus norvegicus, contracted acute infection and died by trypanosomiasis within a week. Laboratory stock of T. gambiense (BW-NIH-UT strain), after being maintained over nine years in P. m. gambeli by syringe passage, has not lost its original virulence and pathogenicity to susceptible test animals. P. m. gambeli (albino, colored and hairless) is recommended for maintaining laboratory stock of T. gambiense as a time-saving and safe procedure. The possibility of certain species of American rodents becoming reservoir hosts for pathogenic African trypanosomes and the danger of introducing ruminants infected with trypanosomiasis from Africa to America, Asia and Europe where mechanical transmission of the disease from them to indigenous mammals by blood-sucking insects, vampire bat, etc., may take place is discussed.

AD-611 942 Div. 16

Army Tropical Research Medical Lab., New York (APO 851).
DAILY URINARY EXCRETION OF FOLIC ACID IN NORMAL SUBJECTS AND IN PATIENTS WITH TROPICAL SPRUE,
by Rafael Santini, Jr., Thomas W. Sheehy, Josefina Aviles, and Ivonne Davila. 1962, 2p

Unclassified report

Pub. in American Journal of Tropical Medicine and Hygiene (U. S.) v11 n3 p421-22 May 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Deficiency diseases, Metabolism), (*Folic acid, Excretion), Urine, Vitamins, Statistical analysis.

In 21 untreated and 7 treated patients with sprue and 12 normal persons the average daily urinary excretion of folic acid was found to be 2.0 ± 0.9, 3.4 ± 1.5 and 5.6 ± 1.4 micrograms, respectively. The difference between the average amounts excreted by the sprue patients and the control group is statistically significant. (Author)

AD-611 946 Div. 16, 28, 30

Technology, Inc., Dayton, Ohio.
MECHANICAL IMPEDANCE AS A TOOL IN RESEARCH ON HUMAN RESPONSE TO ACCELERATION.
Final rept. for Jul 62-May 64,
by Edmund B. Weis, Jr., Neville P. Clarke, James W. Binkley, and Paul J. Martin. 1964, 10p
Contract AF33 657 10010, Poj. 7231, Task 723101
AMRL TR-65-7

Unclassified report

Pub. in Aerospace Medicine (U. S.) v35 n10 p945-50 Oct 1964 (Copies not available to DDC or

Clearinghouse customers).
Presented at the Aerospace Medical Association Meeting in Miami, Florida, May 12, 1964.

Descriptors: (*Human engineering, Acceleration tolerance), (*Acceleration tolerance, Human engineering), (*Aerospace craft, Human engineering), Aviation medicine, Space medicine, Humans, Biophysics, Mathematical models.

The problem of developing quantitative standards and design limits for human exposures to dynamic acceleration is discussed. The concept of the development of a mechanical impedance model of the human to quantitate energy transfer from the environment to the human is reviewed. The methods of measurement and calculation of impedance as well as some current results are discussed. The utilization of the impedance results in the process of protection system development is presented as a criterion for performance. The meaning of the impedance results and their correlation with tolerance experimentation is discussed. (Author)

AD-611 951 Div. 16

Naval Medical Research Inst., Bethesda, Md.
DIGENETIC TREMATODES OF FISHES FROM PALAWAN ISLAND, PHILIPPINES. IV. SOME IMMATURE DIDYMOZOIDAE, A BUCEPHALID; A NEW HEMIUROID GENUS AND SUBFAMILY.
Rept. no. 13,
by Jacob H. Fischthal and Robert E. Kuntz.
3 Oct 63, 9p
Proj. MR0005 09 1606 01

Unclassified report

Pub. in Journal of Parasitology (U. S.) v50 n2 p253-60 Apr 1964 (Copies available only to DDC users).

Prepared in cooperation Harpur Coll., Endicott, N. Y. and New York State Univ., Binghamton.

Descriptors: (*Fishes, Parasites), (*Parasites, Trematodes), (*Trematodes, Morphology), Life cycle, Ecology, Philippines.

Three immature didymozoids are reported from fishes of Palawan Island, Philippines: Torticaecum nipponicum Yamaguti, 1942, from Eleotris fusca; Immature Didymozoid A from Puntius binotatus; and Immature Didymozoid B from Euthynnus yaito. A review of didymozoids listed as Distomum fenestratum Linton, 1907, in the U. S. National Museum Helminthological Collection resulted in their separation into two district forms: D. fenestratum from Gymnothorax moringa, Haemulon plumieri, H. sciurus, H. parra, Remora remora, Scorpaena sp., and Pseudupeneus maculatus; and Immature Didymozoid C from Brevoortia tyrannus, Ammodytes americanus, and Etrumeus sadina. Bucephaloides sibi (Yamaguti, 1940) Hopkins, 1954 (Bucephalidae) is reported from Euthynnus yaito; and Pelorohelmins palawanensis gen. n., sp. n. (Hemiuroidea) from Gazza minuta is described. A new subfamily, Pelorohelminthinae, is created for the latter genus and appears to be most closely related to the family Isoparorchiidae. (Author)

AD-611 952 Div. 16

Naval Medical Research Inst., Bethesda, Md.
SEROLOGICAL STUDIES ON GROUP- AND SPECIES-SPECIFIC ANTIGENS OF TRACHOMA AND INCLUSION CONJUNCTIVITIS (TRIC) AGENTS.
Research rept.,
by A. L. Terzin, N. A. Vedros, and J. B. Johnston.
3 Dec 63, 15p Rept. no. R-6
Proj. MR005 09 1200 05

Unclassified report

Pub. in Journal of Hygiene (Gt. Brit.) v62 p185-98 1964 (Copies available only to DDC users).

Descriptors: (*Viruses, Antigens and antibodies), (*Antigens and antibodies, Immune serums), (*Immune serums, Effectiveness), Preparation, Antigen - antibody reactions, Infections, Tissue culture, Immunity, Absorption (Biological).

Group-reactive ether soluble psittacosis and boiled mouse pneumonitis antigens were tested in parallel, with 85 serum specimens. The results indicate that the group-specific C.F. antigens of these organisms are indistinguishable when tested against sera of trachoma patients, monkeys infected with trachoma or against sera of other individuals. Sera of rabbits immunized with viable trachoma-inclusion conjunctivitis (TRIC) organisms, grown in tissue culture, were absorbed with boiled elementary body suspension of mouse pneumonitis agent, which removed the group reactive antibodies, and resulted in a species-specific anti-TRIC serum. The absorbed and unabsorbed TRIC sera were titrated against purified E.B. suspensions, which were prepared both from yolk and from tissue culture grown organisms, of homologous TRIC strains and from other heterologous Bedsonia organisms. Results of absorption experiments indicate that group reactive antigens prepared from mouse pneumonitis and psittacosis are indistinguishable by C.F. test from the group-specific component of the TRIC antigens. The species-specific antigen of the TRIC agents was well distinguished from the species-specific antigen of the psittacosis agent. However, the C.F. test did not distinguish the strains isolated from trachoma from those isolated from cases of inclusion conjunctivitis. The stabilizing effect of sucrose and albumin upon the species-specific C.F. antigen of purified elementary bodies of TRIC organisms was pronounced. (Author)

AD-611 953 Div. 16

Naval Medical Research Inst., Bethesda, Md.
AMPHISTOMES (TREMATODA) FROM DOMESTIC RUMINANTS IN NORTH BORNEO (MALAYSIA).
Rept. no. 8,
by G. A. Schad, R. E. Kuntz, R. K. Anteson, and G. F. Webster. 11 May 64, 7p
Proj. MR005 09 1606, Task 1

Unclassified report

Pub. in Canadian Journal of Zoology. v42 p1037-40 1964 (Copies available only to DDC users).
Prepared in cooperation with Macdonald Coll., McGill Univ., Montreal (Quebec), and Naval Medical Research Unit No. 2, Taipei (Taiwan).

Descriptors: (*Bovines, Parasites), (*Parasites, Trematodes), (*Trematodes, Morphology), Distribution, Microstructure, Borneo, Taiwan, Canada.

Gastrothylax elongatus, G. synethes, G. cobboldii, Ceylonocotyle streptocoelium, C. scoliocoelium, and Ceylonocotyle gigantopharynx are reported from domestic ruminants of Borneo. C. gigantopharynx is a new name for Paramphistomum gotoi of Dawes, 1936 (not Fukui), redescribed here on the basis of median sagittal sections to permit its placement in the taxonomic system of Nasmark. (Author)

AD-611 954 Div. 16

Naval Medical Research Inst., Bethesda, Md.
'FALSE POSITIVE' COMPLEMENT FIXATION WITH PSITTACOSIS-TRACHOMA ANTIGENS DUE TO ANTIBODIES IN COMPLEMENT PREPARATIONS.
Research rept.,
by Alexander L. Terzin. 3 Dec 63, 7p
Rept. no. R-5
Proj. MR005 09 1200 05

Unclassified report

Pub. in Journal of Hygiene (Gt. Brit.) v62 p179-84 1964 (Copies available only to DDC users).

Descriptors: (*Complement, Impurities), (*Antigen-antibody reactions, Errors), Guinea pigs, Antigens and antibodies, Tests, Diagnostic agents, Preparation.

Complement-fixation tests with psittacosis-trachoma group antigens, if set up with complement prepared from guinea-pigs cross-infected with any of the Bedsonia agents, may give completely false positive results. The use of C.F. positive or C.F. inhibition positive samples of guinea-pig sera as a source of complement can induce also a significant increase or decrease, respectively, of the actual C.F. titres in Bedsonia-positive serum samples tested. Observations made both in routine serology and in experimental studies show the necessity of testing carefully, for possible presence of Bedsonia titres, individual sera of guinea-pigs intended for use as source of complement in C.F. tests performed with Bedsonia group antigens. (Author)

AD-611 958 Div. 16

Institute for Behavioral Research, Silver Spring, Md.
SPECTRAL SENSITIVITY COMPARISON OF ON- AND OFF-RESPONSES OF THE FROG ELECTROETINOGRAM,
by Robert M. Chapman. 10 Jan 64, 9p
Grant NIH NB03590

Unclassified report

Pub. in Vision Research (U.S.) v4 p455-63 1964 (Copies available only to DDC users).
Prepared in cooperation with Walter Reed Army Inst. of Research, Washington, D. C.

Descriptors: (*Retina, Photosensitivity (Biological)), (*Photosensitivity (Biological), Frog), Light, Stimulation, Adaptation (Physiology), Vision, Color vision, Spectra (Visible and ultraviolet).

Slow repetitive stimulation (12/min) and averaging techniques (50 responses) were used to obtain low-level, clearly distinguishable on- and off-responses of the ERG recorded from the intact frog. Spectral sensitivity curves were derived from response-energy functions by the criterion amplitude method. Under dark-adapted and low light-adapted conditions the off-responses were relatively more sensitive to shorter wavelength light than the on-responses. With high-energy light flashes and under high light-adapted conditions the spectral sensitivity of the off-response tended to shift toward longer wavelengths. The short-wavelength sensitivity of the off-response is discussed in terms of the possible role of the blue-sensitive pigment of the green rods. (Author)

AD-611 959 Div. 16

Columbia Univ., New York. Coll. of Physicians and Surgeons.
SPECIFIC FRACTIONATION OF HUMAN ANTI-DEXTRAN ANTIBODIES. III. FRACTIONATION OF ANTI-DEXTRAN BY SEQUENTIAL EXTRACTION WITH OLIGOSACCHARIDES OF INCREASING CHAIN LENGTH AND ATTEMPTS AT SUBFRACTIONATION,
by Justus Gelzer and Elvin A. Kabat. 25 Jun 64, 15p
Grant NSF G18727

Unclassified report

Pub. in Immunochemistry (Gt. Brit.) v1 p303-16 1964 (Copies available only to DDC users).
Research supported in part by Office of Naval Research, Washington, D. C., and National Institutes of Health, Bethesda, Md.

Descriptors: (*Antigens and antibodies, Separation), (*Dextran, Antigens and antibodies), Polysaccharides, Plasma substitutes, Immunology, Molecular properties, Adsorption, Chemical precipitation, Blood serum, Great Britain.

Elution of human antidextran absorbed on sephadex with oligosaccharides of increasing chain length yielded purified antibody fractions which vary in their binding affinity for oligosaccharides of the isomaltose series as measured by their capacities to inhibit complement fixation of the antibody with dextran. The data are interpreted as indicating that these antibody molecules are heterogeneous and that with one antiserum the bulk of such heterogeneity in complementarity occurs in the region from the first alpha-a-glucosyl linkage to the fourth glucose from the non-reducing end of the hapten; with another antiserum the fifth glucose was involved. Attempts at subfractionation to obtain more homogeneous fractions were relatively unsuccessful. (Author)

AD-611 961 Div. 16

Illinois Univ., Urbana.
LETHAL HIGH TEMPERATURES FOR THREE MARINE INVERTEBRATES: LIMULUS POLYPHEMUS, LITTORINA LITTOREA AND PAGURUS LONGICARPUS,
by G. Fraenkel. 1960, 16p
Contract Nonr183407

Unclassified report

Pub. in Oikos. Acta Oecologica Scandinavica (Denmark) v11 n2 p171-82 1960 (Copies available only to DDC users).
Research made in cooperation with Woods Hole Oceanographic Institution, Mass.

Descriptors: (*Aquatic animals, Heat tolerance), Invertebrates, Temperature, Adaptation (Physiology), Exposure, Crustacea, Gastropoda.

The lethal high temperatures were determined for three marine invertebrates, Limulus polyphemus, Littorina littorea, and Pagurus longicarpus, by employing constant exposure temperatures, exposure times between several minutes and several hours, and survival after 24 hours as criteria. For one-hour exposure they were found to be 44 degrees for Limulus, 40 to 41 degrees for Littorina, and 36 degrees for Pagurus. The importance of considering the time factor, using constant temperatures, and choosing proper criteria for judging survival has been stressed. The best criteria for survival were considered to be certain indices for normal behavior, in Limulus the habit to dig into sand, in Littorina the tendency to crawl up vertical surfaces, and in Pagurus the urge to reoccupy a snail shell when out of the shell. By comparison with the results for other marine invertebrates from other authors, the lethal temperatures found for Limulus and Littorina were very high. These data are considered as temperature adaptation

in organisms which are habitually exposed to high temperatures. (Author)

AD-611 971 Div. 16

Army Medical Research and Nutrition Lab., Denver, Colo.
RELATIVE DISTRIBUTION OF CHOLESTEROL IN PLASMA AND LIVER COMPARTMENTS OF CHICKS FED DIFFERENT FATTY ACIDS,
by G. A. Leveille and H. E. Sauberlich. 2 Sep 64, 4p
Unclassified report

Pub. in Society for Experimental Biology and Medicine, Proceedings (U. S.) v117 p653-6 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cholesterol, Distribution), (*Blood plasma, Cholesterol), (*Liver, Cholesterol), (*Fatty acids, Metabolism), Chickens, Diet, Stearates, Linoleic acid, Lipids, Absorption (Biological).

Growing male chicks were fed a fat-free diet or this diet supplemented with stearic, oleic or linoleic acid, with or without added cholesterol. In cholesterol-fed chicks, dietary oleic or linoleic acid increased plasma and liver cholesterol levels and plasma lipid phosphorus levels. Oleic acid-fed chicks had lower plasma and higher liver cholesterol levels than did linoleic acid-fed animals. The total liver-plasma cholesterol pool was higher in oleic than in linoleic acid-fed chicks, but there was a significant difference in distribution of cholesterol between these two compartments. Total liver lipids paralleled liver cholesterol levels. The fatty acids fed had relatively little effect on the plasma and liver cholesterol levels of chicks receiving a cholesterol-free diet. (Author)

AD-611 972 Div. 16

Army Medical Unit, Fort Detrick, Md.
EFFECT OF EGG YOLK AND PHOSPHATIDES ON ANTHRAX INFECTION OF RATS AND GUINEA PIGS,
by William D. Sawyer, Ralph W. Kuehne, and William S. Gochenour, Jr. 2 Sep 64, 4p
Unclassified report

Pub. in Society for Experimental Biology and Medicine. Proceedings (U. S.) v118- p105-8 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bacillus anthracus, Culture media), (*Phospholipids, Culture media), (*Culture media, Phospholipids), Spores, Rats, Guinea pigs, Leathal dosage, Amines, Amino acids, Inositols, Eggs, Diseases.

Suspension of anthrax spores or vegetative cells in phosphatidyl ethanolamine, or the related phosphatides, phosphatidyl serine and phosphatidyl inositol, markedly reduced the intraperitoneal median lethal dose for guinea pigs and Sprague-Dawley rats, thus duplicating the effect of whole chicken egg yolk. Quantitative considerations indicated that the amount of phosphatidyl ethanolamine present in yolk could account for the effect of yolk. Lecithin, the other major phosphatide of yolk, was ineffective. Phosphatidyl ethanolamine appeared to influence the initial phases of host-bacterium interaction.

AD-611 974 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
ENDOTOXIN DETOXIFICATION BY GUINEA PIG TISSUE HOMOGENATES AND POSSIBLE SIGNIFICANCE OF THIS REACTION IN VIVO,
by W. Edmund Farrar, Jr. 2 Sep 64, 5p
Unclassified report

Pub. in Society for Experimental Biology and Medicine. Proceedings (U. S.) v118 p218-21 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Toxins and antitoxins, Tissues (Biology)), Toxicity, Guinea pigs, Liver, Spleen, Kidneys, Heart, Bacteria, Adaptation (Physiology).

This report describes the in vitro inactivation of endotoxin by various tissues of the guinea pig, and attempts to assess the physiological role of the spleen in the response of normal animals and those with liver damage to administration of endotoxin.

AD-611 975 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
LEPTOSPIROSIS IN THE UNITED STATES: AN HISTORICAL REVIEW,
by William S. Gochenour, Jr. 1960, 5p
Unclassified report

Pub. in mono. Annual Meeting of the American Veterinary Medicine Association (101st). Scientific Proceedings, n. d. p. 206-210. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Leptospira, Reviews), History, Spirochaetales, Infections, Animals, Diagnosis, Diseases, Epidemiology, Etiology, Ecology, Antigens and antibodies, Veterinary medicine.

AD-611 976 Div. 16, 20

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
SKIN TEMPERATURE RESPONSES TO OPTICALLY FILTERED INTENSE THERMAL RADIATION.
Final rept. for Mar 63-Mar 64,
by W. C. Kaufman and J. C. Pittman, Jr. Dec 64, 9p
AMRL-TR-65-12
Proj. 7164, Task 716409
Unclassified report

Pub. in Aerospace Medicine (U. S.) v35 n12 p1167-71 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Skin, Thermal radiation), (*Thermal radiation, Optical filters), (*Optical filters, Thermal radiation), Hands, Glass, Acrylic resins, Laminated glass, Attenuation, Burns, Temperature, Radiometers, Tungsten, Quartz.

Consideration of the spectral character of some filters and human skin indicates that the thermal response of natural skin exposed to thermal radiation should be a function of the spectrum as well as the energy level of the thermal radiation. A series of experiments has been performed to describe some of these effects. Surface temperature measurements were made with a radiometer and with surface thermocouples. Simultaneously, intradermal temperatures were measured with thermo-

couples threaded through the skin. Various optical filters absorb thermal radiation and so provide an attenuation of energy which significantly reduces the thermal response of human skin. The temperature response of natural human skin to plexiglass-filtered energy is approximately 1/2 that predicted by published equations based on the response for the simplest case, that of ink-blackened skin exposed to energy shown through a glass condensing lens. Filters also change the spectrum of thermal radiation in such a way that the spectral characteristics of skin can become significant. In extreme cases black skin may be burned while white skin is not. (Author)

AD-611 980 Div. 16

Charleston Coll., S. C.
PROTEOLYTIC ATTACK OF THE CHROMOPROTEINS OF PORPHYRA BY MARINE BACTERIAL ENZYMES,
by Joseph R. Merkel, Gordon D. Braithwaite, and Henry Kritzler. 28 May 64, 8p
Contracts Nonr61005, Nonr243901
Unclassified report

Pub. in Journal of Bacteriology (U. S.) v88 n4 p974-80 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Algae, Chromoproteins), (*Chromoproteins, Hydrolysis), (*Bacterial extracts, Peptide hydrolases), (*Peptide hydrolases, Chromoproteins), Chromatographic analysis, Enzymes, Trypsin, Organic pigments, Absorption spectrum.

Three chromoproteins were isolated from the marine red alga, Porphyra leucosticta (Thuret), and were purified by adsorption chromatography on calcium phosphate gel and by ammonium sulfate fractionation. The algal chromoproteins were subjected to the proteolytic action of cultures of actively growing marine bacteria, marine bacterial culture filtrates, trypsin, and various marine bacterial enzyme preparations. Digestion of the chromoproteins was followed through various incubation intervals by measuring the loss of chromophore color and the increase in either ninhydrin-positive material (570 millimicrons) or 280 millimicrons light-absorbing material. There was good correlation between the loss of color and enzymatic hydrolysis of the proteins. This was particularly evident when a marine pseudomonad proteinase preparation was used as the proteolytic agent. In every digestion mixture, phycoerythrin was more resistant to degradation than was phycocyanin or allophycocyanin. Phycoerythrin was also more resistant to heat than was phycocyanin or allophycocyanin. (Author)

AD-611 982 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
BRAIN-STEM NEURONAL RESPONSE PATTERNS TO MONAURAL AND BINAURAL TONES,
by George Moushegian, Allen Rupert, and Milton A. Whitcomb. 14 May 64, 19p
Unclassified report

Pub. in Journal of Neurophysiology (U. S.) v27 p1174-91 1964 (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with National Academy of Sciences-National Research Council, Washington, D. C.

Descriptors: (*Nerve impulses, Auditory signals), (*Auditory signals, Nerve impulses), (*Ear, Stimulation), Nerve cells, Audiofrequency, Sensitivity, Inhibition, Phase studies, Thresholds (Physiology), Nerve fibers, Spikes, Nuclei (Biology), Cats.

Monaural stimulation of accessory nucleus afferents by tones produces increases or decreases in spike output. The activity of these units is altered by small changes in the stimuli and is suggestive of excitatory and inhibitory influences. Response-area measurements indicate that the inputs to accessory units may be either bilaterally excitatory or bilaterally excitatory and inhibitory. Some accessory units show best interactive effects when the frequencies from each ear are near identical. Phase studies reveal that units of the accessory nucleus are differentially tuned to small changes in phase angle of binaural tones. Dichotic tonal stimulation for some units of accessory nucleus results in considerable latency changes which are related to the intensities at each ear. Units within and near the accessory nucleus exhibit intrafiber volleying patterns. Throughout tonal stimulation these units fire with intervals which are equal to or some multiples of the stimulus period. (Author)

AD-611 983 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
THE EFFECT OF ACETYLPHENYLHYDRAZINE UPON EPITHELIAL TURNOVER IN THE SMALL INTESTINE,
by Marcel E. Conrad, Lewis R. Weintraub, Betty Merrill, and William H. Crosby. 1964, 4p
Unclassified report

Pub. in American Journal of Digestive Diseases (U. S.) v10 n1 p43-46 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrazine derivatives, Toxicity), Intestines, Cells (Biology), Life span, Labeled substances, Hemopoietic system, Pathology, Autoradiography.

Administration of acetylphenylhydrazine to rats produced an accelerated turnover of jejunal and duodenal mucosal cells without altering the appearance of the cells or the structure of the villi. (Author)

AD-611 985 Div. 16

Walter Reed Army Inst. of Research, Washington, D.C.
KINETICS OF PERITONEAL FLUID ABSORPTION IN ADULT MAN,
by Leroy Shear, Charles Swartz, James A. Shinaberger, and Kevin G. Barry. 1965, 5p
Unclassified report

Pub. in New England Journal of Medicine (U. S.) v272 p123-7 Jan 21 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Absorption (Biological), Peritoneum), (*Peritoneum, Absorption (Biological)), Adults, Parenteral infusions, Electrolytes (Physiology), Fluids, Blood serum, Body fluids, Osmosis, Measurement.

Absorption of intraperitoneally administered saline solution was studied in 4 adult human subjects. An isotopic method that permits accurate measurement of rate of absorption with time is described. Absorption appeared to occur in two phases. During the initial two hours after intraperitoneal infusion (equilibration phase) solute concentrations became equilibrated between serum and peritoneal fluid. The volume of fluid absorbed

during this period depended chiefly upon serum osmolality and upon the similarity between solute content of intraperitoneal and interstitial fluids. After osmotic equilibration (absorption phase) fluid was absorbed from the peritoneal cavity at a constant rate that varied from 29.7 to 37.3 ml. per hour. (Author)

AD-611 986 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
CHARACTERIZATION OF PROTOTYPE VIRUS ECHO-32,
by William C. Branche, Jr., Viola Mae Young, Felicenne M. Houston, and Lucille W. Koontz.
17 Jun 64, 4p
Unclassified report

Pub. in Society for Experimental Biology and Medicine. Proceedings (U. S.) v118 p186-90 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with National Institutes of Health, Bethesda, Md.

Descriptors: (*ECHO virus, Physical properties), Enteroviruses, Tissue culture, Identification, Purification, Stability, Nucleic acids, Ribonucleic acids, Morphology (Biology), Diseases, Tests, Gastrointestinal system, Antigens and antibodies, Puerto Rico.

A viral agent, PR10, isolated from a Puerto Rican infant with gastroenteritis has been designated as the prototype strain of ECHO-32 by the Panel for Picornaviruses. ECHO-32 (1) produced enterovirus-like CPE in rhesus monkey kidney tissue cultures, (2) bore no antigenic relationship to known enteroviruses, (3) produced no disease in the common laboratory animals or embryonated eggs, (4) was insensitive to desoxycholate or ether, (5) was stabilized by M MgCl2 to heating at 50C for one hour, (6) demonstrated a red staining reaction with acridine orange indicating an RNA core, and (7) was estimated to be 26-27 millimicrons size. (Author)

AD-611 987 Div. 16

Walter Reed Army Medical Center, Washington, D. C.
SERUM PROTEINS IN TROPICAL DISEASES: A REVIEW,
by Peter H. Schur. 1963, 4p
Unclassified report

Pub. in Journal of Tropical Medicine and Hygiene (Gt. Brit.) v67 p260-63 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Blood proteins, Diseases), (*Tropical regions, Diseases), Immunity, Pathology, Therapy, Serum albumin, Fibrinogen, Gamma globulin, Amino acids, Labeled substances, Deficiency diseases, Parasitic diseases, Infectious diseases, Antigens and antibodies, Reviews.

The paper reviews some of the current thinking regarding the variation in concentration of serum proteins in tropical disorders, the pathophysiology of these changes, and the uses of serum proteins in the treatment of tropical diseases.

AD-611 988 Div. 16

Walter Reed Army Inst. of Research, Washington, D. C.
FRACTIONATION OF OLIGONUCLEOTIDES OF YEAST SOLUBLE RIBONUCLEIC ACIDS BY COUNTERCURRENT DISTRIBUTION,
by B. P. Doctor and G. J. McCormick. 10 Aug 64, 6p
Unclassified report

Pub. in Biochemistry (U. S.) v4 p49-53 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nucleotides, Chemical analysis), (*Ribonucleic acids, Molecular structure), Separation, Chromatographic analysis, Absorption spectrum, Polymers, Yeasts.

Yeast s-RNA was subjected to pancreatic RNAase and the degradation products were fractionated by chromatography on DEAE-cellulose in 7 M urea with a NaCl gradient. Fractions corresponding to hexa- and heptanucleotides were further fractionated by 700- and 400-transfer countercurrent distribution, respectively. Two fractions present in the hexanucleotide appear to be (Ap)2(Gp)3Cp and (Ap)3(Gp)2Cp. Three fractions present in the heptanucleotide fraction appear to be (Ap)2(Gp)4Cp, (Ap)4(Gp)2Cp, and a nonanucleotide (Ap)5(Gp)3Cp, respectively. The Gp content of the fractions appears to decrease with the increase in partition coefficient, whereas the reverse appears to be true for the Ap content of the fractions. (Author)

AD-611 990 Div. 16

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
CORONARY ARTERY ANOMALIES,
by Hu A. Blake, William C. Manion, Thomas W. Mattingly, and Giorgio Baroldi. 1963, 14p
Unclassified report

Pub. in Circulation (U. S.) v30 p927-40 Dec 1964 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Brooke General Hospital, Walter Reed General Hospital, the Registry of Cardiovascular Pathology, and the Veterans Administration Central Lab. for Anatomic Pathology and Research, AFIP, Washington, D. C.

Descriptors: (*Cardiovascular system, Anomalies), (*Heart, Arteries), (*Arteries, Heart), Blood vessels, Pathology, History, Physiology, Anatomy, Surgical techniques, Cannulation, Pictures, Photographs.

Twenty-two selected anomalies of the coronary arteries are related to cases previously reported in the literature. These are presented with simplified drawings and photographs in an attempt to provide a workable understanding of the practical problems such create for both the internist and surgeon.

AD-611 991 Div. 16

Illinois Univ., Urbana.
ALPHA-AMIDINIUM THIOSULFATES (BUNTE SALTS) AS ANTIRADIATION DRUGS,
by Ludwig Bauer and Karen Rover Sandberg.
24 Jul 64, 3p
Contract DA49 193MD2047
Unclassified report

Pub. in Journal of Medicinal Chemistry (U. S.) v7 p766-8 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radioprotective agents, Synthesis (Chemistry)), (*Thiosulfates, Radioprotective agents), Amines, Salts, Effectiveness.

The synthesis of a number of alpha-amidinium thiosulfates is described and their protective action against ionizing radiation is reported. (Author)

AD-611 997 Div. 16

Stanford Univ., Calif.
RECEPTIVE-FIELD ORGANIZATION AND RESPONSE PATTERNS IN NEURONS WITH SPATIALLY DISTRIBUTED INPUT,
by Donald Kennedy and DeForest Mellon, Jr. 1963, 14p
Grant AF AFOSR334 63
AFOSR 65 0299

Unclassified report

Pub. in Neural Theory and Modeling, Stanford, p400-13 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nerve impulses, Propagation), (*Arthropods, Nerve impulses), Nerve cells, Ganglia, Nerve fibers, Stimulation, Abdomen, Spikes, Nervous system, Reflexes.

The majority of central interneurons which respond to tactile stimulation of the dorsal abdomen in crayfish serve more than one abdominal segment; a given sensory field is thus represented many times centrally, but in varying combinations with other fields. The usual pattern of peripheral connection with these multisegmental interneurons is one in which incoming afferent fibers in each ganglion synapse in the segment of entry with the interneuron, but also pass anteriorly for one or more segments and make accessory synaptic contacts with the same interneuron in other ganglia. Such accessory connections are also sometimes made in the posterior direction, but they are always weaker. The receptive field of the interneurons is therefore capable of broad summation, but it is at the same time fractionated into segmental subareas which have local entry to the interneuron and hence short reflex delays. Since the strongest synaptic connections made by afferent fibers are in their own ganglion of entry, the single interneuron is a network of spatially segregated input zones with spike-conducting regions between. Impulses therefore may interact by colliding with one another, or by producing refractoriness or facilitation, or both, by after-potentials in ganglia through which they propagate. It is possible to show that in response to sequential activation (which mimics the effect of a moving natural stimulus) the frequency of discharge may be sensitive to both the direction of the sequency and to its velocity. (Author)

AD-612 002 Div. 16

Institute for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park.
MATHEMATICAL ANALYSIS OF SODIUM REABSORPTION IN PROXIMAL PART OF NEPHRON IN PRESENCE OF NONREABSORBED SOLUTE,
by R. B. Kelman. 17 Dec 63, 5p
Contract Nonr59517

Unclassified report

Pub. in Journal of Theoretical Biology (U. S.) v8 p22-6 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Kidneys, Absorption (Biological)), (*Sodium, Absorption (Biological)), (*Absorption (Biological), Mathematical analysis), Mathematical models, Integral equations, Diuretics.

The reabsorption kinetics of sodium and water in the proximal tubule in the presence of a nonreabsorbed solute are mathematically analysed. It is assumed that the rate of reabsorption depends on the flow rate as well as the sodium concentration. The theoretical predictions appear to be consonant with the small amount of data available from mannitol loading experiments. More data are needed, however, before firm conclusions regarding the validity of the theory can be made. (Author)

AD-612 003 Div. 16, 4

Washington Univ., Seattle.
THE REACTION OF CARBOXYPEPTIDASE A WITH HIPPURYL-DL-BETA-PHENYLLACTATE,
by William O. McClure, Hans Neurath, and Kenneth A. Walsh. 21 Aug 64, 6p
Contract Nonr47704; Grant PHS GM04617

Unclassified report

Pub. in Biochemistry (U. S.) v3 p1897-901 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Peptide hydrolases, Reaction kinetics), (*Amino acids, Hydrolysis), (*Hydrolysis, Reaction kinetics), Complex compounds, Peptides, pH, Temperature, Lactates.

The action of carboxypeptidase A on hippuryl-dl-beta-phenyllactate was examined over a 2860-fold range of substrate concentration. The system is characterized by a complex inhibition by excess substrate, which suggests either that the enzyme binds substrate to form several inactive complexes or that the enzyme exists as several differentially susceptible species. Initial velocities measured at substrate concentrations low enough to avoid substrate inhibition yield maximum velocities which are the highest yet reported for any substrate for carboxypeptidase A. In this range of substrate concentrations the rates are independent of pH between pH 7.5 and 9.7, indicating that the unusual pH rate profile previously reported for the action of carboxypeptidase on hippuryl-dl-beta-phenyllactate (J. F. Riordan and B. L. Vallee (1963), Biochemistry 2, 1460) is not due to substrate inhibition. Measurements of the effect of temperature on the reaction velocity yield activation parameters which are of the same order of magnitude as those previously reported for peptide substrates. (Author)

AD-612 004 Div. 16

Illinois Univ., Urbana. Coll. of Veterinary Medicine.
THE IMMUNOLOGIC BEHAVIOR OF BABY PIGS. IV. INTESTINAL ABSORPTION AND PERSISTENCE OF 6.6S AND 18S ANTIBODIES OF OVINE ORIGIN AND THEIR ROLE IN THE IMMUNOLOGIC COMPETENCE OF BABY PIGS,
by R. F. Locke, D. Segre, and W. L. Myers.
23 Mar 64, 9p
Contract Nonr183437, Proj. NR103 509

Unclassified repor

Pub. in Journal of Immunology (U. S.) v93 n4 p576-83 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Swine, Immunity), (*Immunity, Swine),

Absorption (Biological), Intestines, Antigens and antibodies, Mammals, Corynebacterium, Diseases, Vaccines, Clostridium tetani, Toxins and antitoxins, globulins, Purification, Molecular weight, Veterinary medicine.

Low molecular weight (6.6S) diphtheria and tetanus antibodies of ovine origin were absorbed relatively efficiently through the intestine of newborn, colostrum-deprived pigs, whereas high molecular weight (18S) antibodies were absorbed poorly or not at all. Antibodies contained in 750 mg of purified 6.6S ovine globulin, administered orally and intraperitoneally, were eliminated from the circulation of newborn pigs at a constant exponential rate. The 6.6S globulin did not stimulate the production of anti-sheep globulin by the recipient pigs. Intraperitoneal administration of 750 mg of crude ovine globulin, containing antibodies in both the 6.6S and 18S fractions, resulted in an immune-type elimination of the passive antibodies by the recipient newborn pigs. This treatment resulted in the production of anti-sheep globulin by the recipient pigs. Dilute 6.6S ovine antitoxin, premixed with toxoid and injected intraperitoneally into 3-week-old, colostrum-deprived pigs, induced the production of relatively large quantities of tetanus and diphtheria antibodies by the recipient pigs. Dilute 18S antitoxin plus toxoid, under the same circumstances, failed to stimulate diphtheria antibody formation but resulted in the production of high titers of tetanus antibodies. (Author)

AD-612 021 Div. 16, 4, 12
CFSTI Prices: HC$4.00 MF$0.75

Denver Research Inst., Colo.
INVESTIGATION AND DESIGN OF A REGENERABLE SILVER OXIDE SYSTEM FOR CARBON DIOXIDE CONTROL.
Final rept. for 1 Apr 63-31 Mr 64,
by W. J. Culbertson, Jr. Dec 64, 113p Rept. no. 402
Contract AF33 657 10928, Proj. 6373, Task 637302
AMRL TR-64-119 Unclassified report

See also AD-272 919, AD-293 224.

Descriptors: (*Carbon dioxide, Control), (*Silver compounds, Oxides), (*Life support, Space flight), (*Respiration, Carbon dioxide), Absorption, Carbonates, Oxygen equipment, Regeneration, Design, Moisture, Water, Yttrium, Zinc compounds, Lead compounds, Ions, Ctalysts.

Precipitated silver carbonate was investigated using test tube samples to establish the merits of this approach to an Ag2O solids system for CO2 removal. Moisture catalyzes transport of CO2 or Ag(+) through an Ag2CO3 layer protecting the Ag2O from conversion to Ag2CO3. Regeneration to Ag2O may be accomplished in moist partial vacuum at 125C within 2 hours. H2O must reach the decomposing Ag2CO3 by penetrating a protective Ag2O layer counterflow to the outflowing CO2. Moisture is not necessary with Y(+++) catalyst at 150C. Absorption is speeded 2-3 fold with Y(+++) catalyst. At 1/2% CO2 and 50% humidity 75% yield is attained within 16 hours. Y(+++) dissolved in the cation lattice is believed to induce Ag(+) vacancies in Ag2CO3 and increase Ag(+) transport through the Ag2CO3 layer. H2O may catalyze by supplying OH(-) which dissolves in the anion lattice inducing Ag(+) vacancies. Preliminary work on several other metal oxides showed Zn and Pb to be most promising of these as a substitute for the short-lived Ag2O.

AD-612 133 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Dugway Proving Ground, Utah.
THE INFLUENCE OF STORAGE, AEROSOLIZATION, AND REHYDRATION ON THE PERMEABILITY OF PASTEURELLA TULARENSIS,
by Dora K. Hayes and Victor J. Cabelli. 1962, 13p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64. Volume I, AD-611 432.

Descriptors: (*Pasteurella tularensis, Collecting methods), (*Bacterial aerosols, Pasteurella tularensis), Phosphates, Inorganic compounds, Organic phosphorus compounds, Nucleoproteins, Nucleotides, Carbohydrates, Metabolism, Samplers, Storage, Permeability, Maintainability.

Conclusions: Aerosolized cells collected in phosphate-free solutions lose the ability to maintain phosphates against a concentration gradient. Factors which are age dependent are involved in this ability. Other stresses also result in a loss of intracellular phosphate, and the rate of loss appears to be temperature dependent. Organic phosphate of the cell appears to be the source of inorganic phosphate lost by the cell. A fraction of cell protein isolated as the nucleoprotein fraction appears to be a source of this phosphate. Nucleotides or breakdown products of nucleotides and proteins can be observed in supernatants and extraction solutions. The amounts of both nucleotides and proteins lost appear to increase as a function of temperature. (Author)

AD-612 138 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Army Medical Unit, Fort Detrick, Md.
A MECHANISM OF ACTION OF STAPHYLOCOCCAL ENTEROTOXIN POISONING,
by Gerald J. Crawley, John N. Black, Irving Gray, and Wayne A. Leblang. 1964, 15p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I.

Descriptors: (*Food poisoning, Staphylococcus), (*Staphylococcus, Food poisoning), (*Toxins and antitoxins, Food poisoning), Toxic tolerances, Leukocytes, Serum albumin, Lungs, Body fluids, Proteins, Kidneys, Liver, Thyroid gland, Excretion, Iodine, Labeled substances, Radioactive isotopes, Histological techniques, Laboratory animals, Tissues (Biology).

These studies provide no information concerning the possible role of the central nervous system in the pathogenesis of acute staphylococcal toxin reactions, nor to the cause of vomition and diarrhea. They do suggest that (a) the toxin is bound initially to WBC's and albumin, (b) that toxin-bound WBC's are trapped in the lung, (c) that the lungs develop increased weight due to interstitial fluid accumulation which occurs coincident with the loss of vascular fluid, but with the unchanged total body water, ICW and ECF, and (d) that re-challenged and resistant animals handle toxin in a different fashion, evidenced by an early increased accumulation of I 131 label in the liver and an increased clearance of I 131 free of protein by the kidney and thryoid. (Author)

AD-612 139 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Army Medical Unit, Fort Detrick, Md.

THE EFFECT OF HYPERTHERMIA ON PROTEIN TURNOVER IN INFECTION,
by Irving Gray and Paul V. Hildebrandt. 1963, 8p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Fevers, Metabolism), (*Virus diseases, Metabolism), Proteins, Synthesis, Nitrogen, Excretion, Agglutinins, Globulins, Nutrition, Chimpanzees.

Protein metabolism was followed in control, hyperthermia, and hyperthermia plus virus studies. Breakdown is increased in both experimental groups over that in the control group. It is concluded that this increase, caused primarily by the fever, contributed to the previously observed increased nitrogen excretion. Evidence is presented to support the concept that protein synthesis is stimulated by the presence of virus at a time simultaneous with that of the observed protein breakdown. (Author)

AD-612 142 Div. 16, 4
CFSTI Prices: HC$1.00 MF$0.50

Army Natick Labs., Mass.
POTENTIAL RADIATION-PROTECTIVE COMPOUNDS. SYNTHESIS OF THE THREE ISOMERIC THREE-CARBON AMINOHYDROXY BUNTE SALTS AND RELATED COMPOUNDS,
by D. H. Ball, J. M. Williams, and L. Long, Jr.
1962, 7p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference United States Military Academy, West Point, N. Y. 17-19 Jun 1964, Volume I, AD-611 432.

Descriptors: (*Radioprotective agents, Thiosulfates), (*Thiosulfates, Synthesis (Chemistry)), Amines, Alcohols, Molecular isomerism, Chromatographic analysis, Salts.

The synthesis of the following aminoalkyl thiosulfates is described: (+)H3NCH2-CH(OH)-CH2SSO3(-); HOCH2-CH(SSO3(-))-CH2NH3(+); HOCH2-CH(NH3(+))-CH2SSO3(-).

AD-612 162 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Walter Reed Army Inst. of Research, Washington, D. C.
MEDICAL TRENDS IN LIFE SUPPORT SYSTEMS,
by Timothy G. Barila. 1964, 8p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Life support, Medical research), Closed ecological systems, Stress (Physiology), Adaptation (Physiology), Life span, Artificial respiration, Surgical techniques, Blood transfusions, Cardiovascular diseases, Accidents, Military medicine, Public health.

Current medical problems and achievements in the support of human life are discussed in terms of their relationship to the advancement of medical knowledge and the present 'American way of life.'

AD-612 163 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Walter Reed Army Inst. of Research, Washington, D. C.
MOLECULAR MECHANISMS OF ANTIMICROBIAL ACTION,
by Fred E. Hahn. 1964, 15p Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Chemotherapeutic agents, Infectious diseases), Military medicine, Communicable diseases, Drugs, Antibiotics, Penicillins, Molecular properties, Biosynthesis, Inhibition, Proteins, Synthesis, Ribonucleic acids, Desoxyribonucleic acids, Ribosomes, Bacteria.

Antibiotics have been found to inhibit (1) cellwall synthesis (penicillin), (2) protein synthesis (chloramphenicol, tetracyclines, streptomycin, erythromycin), (3) RNA synthesis, and (4) DNA synthesis. Mechanisms by which these effects are produced have been studied and typical results of this research are reported. Chloramphenicol and erythromycin appear to inhibit protein biosynthesis by direct interaction with ribosomes. In all instances, the antimicrobial actions occurred in the general area of macromolecular biosynthesis and assemblage.

AD-612 164 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Walter Reed Army Inst. of Research, Washington, D. C.
INFLUENCE OF TRAUMA AND HEMOLYSIS ON HEMORRHAGIC SHOCK IN DOGS,
by Robert M. Hardaway, III. 1963, 15p Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Shock (Pathology), Hemolysis), (*Hemolysis, Shock (Pathology)), (*Hemorrhage, Shock (Pathology)), Blood coagulation, Erythrocytes, Fibrinogen, Heparin, Blood pressure, Dogs.

A small amount (20 ml.) of endogenous hemolyzed blood causes an increase in mortality of dogs in hemorrhagic shock from 13% to 91%. This lethal effect is due to the stimulation by hemolyzed blood of disseminated intravascular coagulation (DIC), (3) which is also stimulated by hemorrhage and shock. The lethal factor is a clotting factor in the red cell. Large amounts (100 ml.) of hemolyzed blood alone is harmless, but even a small amount (20 ml.) is lethal in the presence of shock. Hemolyzed blood causes the conversion of fibrinogen to fibrin. Fibrinolysin will prevent death in irreversible hemorrhagic shock both as produced by hemorrhage alone (10) or as influenced by hemolyzed blood. Endogenous heparin is stimulated by DIC which is produced either by hemorrhage alone, hemolyzed blood alone, or by a combination of both. It is probably a protective mechanism. A markedly prolonged silicone clotting time occurring during hemorrhagic shock is an accurate prognostication of irreversibility. Irreversibility is correlated with a fibrinogen fall, when the fibrinogen fall is due to consumption in DIC. Central venous pressure is not elevated even though the shock is proven to be irreversible. Irreversibility is due to an episode of DIC. (3)

AD-612 201 Div. 16

Columbia Univ., New York.

HISTOCHEMICAL CHANGES IN ENDOTHELIUM OF CORNEAS STORED IN MOIST CHAMBERS,
by J. Pena-Carrillo and Frank M. Polack.
31 Mar 64, 6p
Contract Nonr26671; Grant PHS B492
Unclassified report

Pub. in Archives of Ophthalmology (U. S.) v72 p811-6 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Transplantation, Cornea), (*Cornea, Storage), (*Histological techniques, Cornea), Cell structure, Mitochondria, Cytoplasm, Eye, Moisture, Freezing, Membranes (Biology), Permeability, Oxidoreductases, Lactates, Succinates, Enzymes, Viability, Rabbits, Humans.

Rabbit eyes were stored in moist chambers at 4C for various periods of time to determine the time of appearance and distribution of endothelial changes, as shown by nitro blue tetrazolium reduction in the presence of sodium lactate and succinate. Sixteen hours after storage, 10%-15% of endothelial cells showed heavy staining, which increased gradually with storage time. The number of cells with heavier staining increased to an average of 25%-30% in eyes stored for 48 hours, their distribution being at random throughout the endothelial layer. Such altered cells could not be demonstrated in endothelial preparations stained with hematoxylin. A similar pattern of 'altered' cells was observed in human corneas stored for 24 and 48 hours under the same conditions. It is concluded that in eyes stored in moist chambers at 4C the general increase in formazan deposits in the corneal endothelium, as a whole, indicates cellular damage, and that the increased formazan deposit in a number of cells may indicate irreversible cell damage. These experiments, however, do not show whether the observed changes appreciably reduce the value of such corneas as donor material in penetrating keratoplasties. (Author)

AD-612 228 Div. 16

New York State Psychiatric Inst., N. Y.
QUANTITATIVE ASPECTS OF CO2 FIXATION IN MAMMALIAN BRAIN IN VIVO,
by H. Waelsch, S. Berl, C. A. Rossi, D. D. Clarke, and D. P. Purpura. 22 Jan 64, 13p
Grant AF AFOSR443 63
AFOSR 65-0304
Unclassified report

Pub. in Journal of Neurochemistry (U. S.) v11 p717-28 1964 (Copies available only to DDC customers). Prepared in cooperation with Columbia Univ., New York. Coll. of Physicians and Surgeons.

Descriptors: (*Carbon dioxide, Brain), (*Brain, Metabolism), (*Metabolism, Carboxylic acids), Amino acids, Cerebral cortex, Liver, Nervous system, Ammonia, Glutamine, Synthesis, Radiation chemistry, Mammals.

The data presented in this paper support the conclusion that CO2 fixation in the mammalian brain is a process which responds to the change in the metabolic environment. The rate of CO2 fixation is increased when the tissue is exposed to a metabolic stress, such as an elevated ammonia concentration, which results in an increased synthesis of glutamine. The data show that CO2 fixation is of considerable significance in brain metabolism and not negligible. It plays an essential role in maintaining the concentration of dicarboxylic acids in the citric acid cycle. The continuous removal of oxoglutarate without replenishment would lead to a breakdown of the citric acid cycle and consequently to a deficiency in the production of ATP. Although the data suggest that CO2 fixation may well replenish the intermediates of the citric acid cycle in case of increased ammonia concentration in brain tissue, these acute experiments give no answer as to the chronic effects of ammonia on the citric acid cycle.

AD-612 233 Div. 16, 8

Instituto de Neurologia, Montevideo (Uruguay).
A SIMPLE METHOD FOR MAGNETIC TAPE RECORDING OF BIOELECTRIC POTENTIALS,
by P. Handler and E. Garcia-Austt. 15 Nov 60, 4p
Grant AF AFOSR60 14
AFOSR 2741
Unclassified report

Pub. in Electroencephalography and Clinical Neurophysiology (Canada) v13 p800-2 1961 (Copies available only to DDC users).

Descriptors: (*Magnetic recording systems, Medical equipment), (*Medical equipment, Magnetic recording systems), Magnetic tape, Electroencephalography, Electrocardiography, Electronic switches, Electrical impedance, Diodes (Semiconductor), Correlators, Demodulators.

A system was built which includes a pre-amplification by means of one channel of a Grass IIID Electroencephalograph, a modulator with a 1N34 germanium diode biased (in parallel) with the +3 terminal available at the control panel of the IIID, a recorder (Ampex model 601, 7 1/2 in/sec, full-track), a demodulator of the peak-detection type using a series diode 1N34 and an RC circuit with a time-constant of about 10 msec. The carrier generator was a Grass S4 Stimulator which has an output impedance of 250 ohms and supplies a rectangular wave of a frequency of 2 kc/sec and a duration of 0.25 msec, with an amplitude of about 1V. In spite of a marked 'valley' in the amplitude-frequency curve at about 35 c/sec, it was not necessary to install a high pass filter between the modulator and the recorder. However, to obtain the frequency characteristic required by the International Federation of EEG Societies, it would be necessary to put (in series) a condenser of about 500 pF between the modulator and the recorder. It was also found that the system works without the positive 'clamp', owing, perhaps, to a high frequency deformation of the carrier square wave as well as to the fact that modulation was not very pronounced. (Author)

AD-612 235 Div. 16

Karolinska Inst., Stockholm (Sweden).
STUDIES ON CATECHOLAMINE-CONTAINING GRANULES OF SPECIFIC CELLS IN CYCLOSTOME HEARTS,
by G. Bloom, E. Ostlund, U. S. v. Euler, F. Lishajke, and M. Ritzen. 1961, 35p
Contract AF61 052 309; Grant PHS G4716
AFOSR 3448
Unclassified report

Pub. in Acta Physiologica Scandinavica (Sweden) v53 supp1185 p1-31 1961 (Copies available only to DDC users).

Descriptors: (*Fishes, Heart), (*Heart, Amines), Epinephrine, Levarterenol, Histological techniques, Cells (Biology), Granules, Histamine, Reserpine, Morphology (Biology), Chromatographic analysis, Electron microscopy, Sweden.

Preliminary experiments showed that incubation of

isolated granules from the hearts of Petromyzon and Myxine with reserpine caused an increased rate of release of the catecholamines. In the present paper the specific cells and their storage granules were further studied with histological and electron microscopical techniques. The distribution and occurrence of catecholamines and other catechol substances in extracts of cyclostome hearts was studied with chromatographic technique. The effects of reserpine on the storage granules in vivo and in vitro are also described. In addition, some findings concerning the action of catecholamines on the activity of the isolated heart from Myxine after pretreatment with reserpine are reported.

AD-612 241 Div. 16

Oxford Univ., (England).
MICROBIAL GROWTH ON C-1 COMPOUNDS.
2. SYNTHESIS OF CELL CONSTITUENTS BY METHANOL, AND FORMATE-GROWN PSEUDOMONAS AM 1, AND METHANOL-GROWN HYPHOMICROBIUM VULGARE,
by P. J. Large, D. Peel, and J. R. Quayle.
28 Apr 61, 11p
Contract AF61 052 180
AFOSR 2626

Unclassified report

Pub. in Biochemical Journal (Gt. Brit.) v81 p470-80 1961 (Copies available only to DDC users).

Descriptors: (*Pseudomonas, Metabolism), (*Bacteria, Metabolism), (*Culture medium, Carbon compounds), (*Alcohols, Metabolism), (*Formates, Metabolism), Tracer studies, Cells (Biology), Biosynthesis, Bicarbonates, Amoino acids, Carboxylic acids, Organic phosphorus, Carbon dioxide, Great Britain.

The paper describes an investigation of the path of carbon incorporation from ((14)C)methanol, ((14)C)formate, and ((14)C)bicarbonate into cell constituents during growth of this organism on methanol or formate. Similar experiments, involving ((14)C)methanol and ((14)C)bicarbonates, Amino acids, Carboxylic acids, Organic microbium vulgare, and the data obtained with the two organisms are compared. (Author)

AD-612 243 Div. 16

Suddeutsche Versuchs- und Forschungsanstalt fur Milchwirtschaft, Weihenstephan (West Germany). Bakteriologisches Institut.
THE EFFECT OF MONOIODOACETIC ACID ON THE RESPIRATION AND PHOTOSYNTHESIS IN CHLORELLA. (Die Wirkung von Monojodessigsaure auf Atmung und Photosynthese von Chlorella),
by Von O. Kandler, I. Liesenkotter and B. A. Oaks.
20 Oct 60, 11p
Contract AF61 052 244
AFOSR 1509

Unclassified report

Pub. in Zeitschrift fur Naturforschung (West Germany) v16b n1 p50-61 1961 (Copies available only to DDC users). Text in German.

Descriptors: (*Algae, Photosynthesis), (*Respiration, Algae), (*Iodine compounds, Photosynthesis), Oxidoreductases, Saccharide phosphates, Enzymes, Poisoning, Carboxylic acids, Acetates, Labeled substances, Tracer studies, West Germany.

The distribution of radioactivity after feeding labeled glucose, as well as the change of the pool-size of intermediates, in Chlorella poisoned with monoiodacetic acid (MIA), showed that triosephosphate dehydrogenase is the most sensitive Enzyme in respiration. MIA leads to a large accumulation of fructose diphosphate (FDP) and a large decrease in phosphoglyceric acid (PGA). Also, the breakdown of glucose via 6-phospho-gluconate is inhibited by MIA, as shown by the small change of the C(1)/C(6) ratio. FDP piles up during MIA poisoning in the dark and is quickly transformed to ribulose diphosphate (RuDP), in the light; subsequently, RuDP is transformed to PGA and its derivatives (pyruvate and other acids) by carboxylation and hydrolysis of the ketoacid. Thus, a third pathway of glucose breakdown, by passing glycolysis and the 6-phosphogluconate pathway, is induced by MIA in the light. The photosynthetic CO2 assimilation of Chlorella is about 100 fold more sensitive toward MIA than respiration. By feeding labeled CO2 and determining the concentration of the intermediates formed during MIA poisoning in the light, it is found that, in contrast to the behavior of broken chloroplasts, the reduction of the fixed CO2, is the most sensitive reaction of photosynthesis in Chlorella, rather than the formation of RuDP. (Author)

AD-612 244 Div. 16

Stanford Univ., Calif.
INTRACELLULAR RECORDING FROM PHOTORECEPTOR NEURONS IN THE EYES OF A NUDIBRANCH MOLLUSC (HERMISSENDA CRASSICORNIS),
by John Barth. 28 Sep 63, 7p
Grant AF AFOSR334 63
AFOSR 65-0300

Unclassified report

Pub. in Comparative Biochemistry and Physiology (U. S.) v11 p311-5 1964(Copies available only to DDC users).

Descriptors: (*Mollusca, Photosensitivity (Biological)), (*Photoreceptors, Mollusca), (*Nerve impulses, Photoreceptors), nerve cells, Optic nerve, Retina, Electronic recording systems, Spikes, Inhibition.

Intracellular records obtained from retinal neurons of nudibranch eyes show both excitation and inhibition of impulse discharge upon appropriate photic stimulation, as well as the slow potential changes associated with these events. Evidence is presented that the action potentials originate at some distance from the soma and do not invade it in a retrograde fashion. The presence of synaptic inhibition is demonstrated, but the additional phenomenon of primary inhibition observed in other molluscs has not been established. (Author)

AD-612 285 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Tokugawa Inst. for Biological Research, Tokyo (Japan).
RELATIONSHIP BETWEEN HETEROTROPHIC AND AUTOTROPHIC GROWTH IN CHLORELLA,
by Ikuko Shihira and Eiji Hase. 22 Jan 65, 5p
Grant Nonr G00054 64, Proj. NR104 730

Unclassified report

Descriptors: (*Algae, Growth), Photosynthesis, Chlorophylls, Organic nitrogen compounds, Glucose, Fructoses, Ribonucleic acids, Desoxyribonucleic acids, Proteins, Synthesis, Metabolism, Japan.

The paper investigates the fundamental problem of the

relationship between heterotrophic and autotrophic growth in Chlorella, making use of the particular characteristics of Auxenochlorella.

AD-612 318 Div. 16

Brussels Univ. (Belgium).
CONTRASTS BETWEEN CENTRAL ACTIONS OF CONIINE AND STRYCHNINE (Contrastes entre les Actions Centrales de la Coniine et de la Strychnine),
by V. La Grutta and J. E. Desmedt. 13 May 64, 9p
Grant AF EOAR64 43
AFOSR 65-0309

Unclassified report

Pub. in Archives Internationales de Pharmacodynamie et de Therapie (Belgium) v151 n1/2 p289-96 1964 (Copies available only to DDC users).
Presented to the meeting of the Belgian Society of Physiology and Pharmacodynamics, Liege, 9 May 64. Document in French.

Descriptors: (*Strychnos alkaloids, Pharmacology), (*Central nervous system, Poisoning), (*Poisoning, Alkaloids), Convulsive disorders, Spinal cord, Brain, Nerve cells, Auditory nerve, Pigeons, Cats, Belgium.

The action of coniin or hemlock alcaloid has been analyzed in the cat and in the pigeon with the spinal cord transected at C2 and immobilized with Flaxedil(R). The intravenous injection of 40-60 mg/kg coniin elicits convulsive hypersynchronous activity in the telencephalon but does not modify the spontaneous electrical activity of the spinal cord. These effects contrast with those of strychnine which, in similar preparations, elicits convulsions restricted to the spinal cord. Furthermore the liminal doses of coniin are similar in pigeon and cat, whereas strychnine is about 20 times less active in the pigeon than in the cat. Coniin also antagonizes the olivo-cochlear post-synaptic inhibition without modifying the response evoked by sound in the auditory nerve. Coniin is thus the first drug, besides strychnine and brucine, shown to depress this inhibition. Significant differences namely in the intensity and rapidity of the antagonism suggest that the mode of action of coniin differs from that of strychnine. The interest of the tests used for the screening of strychnine-like actions is stressed. (Author)

AD-612 319 Div. 16

Lund Univ. (Sweden).
SOME OBSERVATIONS ON ADRENERGIC CONNECTIONS BETWEEN MESENCEPHALON AND CEREBRAL HEMISPHERES,
by A. Bertler, B. Falck, C. G. Gottfries, L. Ljunggren, and E. Rosengren. 8 Jul 64, 7p
Grant AF EOAR64 5
AFOSR 65-0308

Unclassified report

Pub. in Acta Pharmacologia et Toxicologia (Denmark). v21 p283-9 1964(Copies available only to DDC users).

Descriptors: (*Brain, Amines), (*Amines, Brain), Nerve cells, Cerebral cortex, Anatomy, Levarterenol, Histological techniques, Rabbits, Pigeons, Sweden.

The striatal dopamine in the rabbit brain is localized in axons at least partly originating from the ventral mesencephalon. A corresponding adrenergic pathway has been directly demonstrated in the pigeon brain. A large portion of the NA in the cerebral hemispheres and the diencephalon of the rabbit has been found to be derived from neurons coming from or passing through the mesencephalon. (Author)

AD-612 339 Div. 16

Catholic Univ., Santiago (Chile).
EFFECT OF VASOPRESSIN STRUCTURAL MODIFICATIONS ON RAT RENAL EXCRETION OF Na, K, AND WATER,
by L. Barnafi, R. Rosas, T. Pereda, and H. Croxatto. 23 Oct 61, 4p
Contract AF49 638 584
AFOSR 3183

Unclassified report

Pub. in American Journal of Physiology (U. S.) v202 n3 p593-96 Mar 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pituitary hormones, Excretion), (*Electrolytes (Physiology), Excretion), Trypsin, Chymotrypsin, Sodium, Potassium, Water, Urine, Amino acids, Blood pressure, Rats, Chile.

Lys8-vasopressin was incubated with trypsin, chymotrypsin, and sodium thioglycollate, and the resultant modification of the effect of the hormone on sodium, potassium, and water excretion was studied. These agents, which destroy the antidiuretic-pressor activity of the hormone, also bring about a loss of its natriuretic and kaliuretic effects. The action of Arg8-vasopressin, Phe2-Lys8-vasopressin, and His2-Lys8-vasopressin on sodium, potassium, and water excretion was studied; comparisons were made with the effects of equivalent pressor doses of Lys8-vasopressin. No significant differences between Arg8- and Lys8-vasopressin were obtained. Phe2-Lys8-vasopressin had nearly ten times the antidiuretic effect and four times the natriuretic and kaliuretic effect. Even though His2-Lys8-vasopressin has an antidiuretic effect, it lacks activity with regard to blood pressure or electrolyte excretion. (Author)

AD-612 376 Div. 16, 5, 8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CERTAIN PROBLEMS OF CONTEMPORARY BIOLOGICAL TELEMETRY,
by V. V. Parin and R. M. Baevskii. 18 Feb 65, 22p
FTD-MT-64-416
TT 65-61816

Unclassified report

Trans. of Fiziologicheskii Zhurnal SSSR, 1964, v. 50, no. 8, p. 924-933.

Descriptors: (*Physiology, Telemeter systems), (*Medical equipment, Telemeter systems), Biology, Space medicine, Medical examination, Electronic recording systems, Data transmission systems, Microminiaturization (Electronics), Telemetering transmitters.

AD-612 413 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MEDICAL PRACTICE, 1963, NO. 10 (SELECTED

ARTICLES),
by A. M. Kakhana, A. A. Koval'chuk, G. P. Pidpalyi, and A. I. Postnyi. 2 Mar 65, 18p
FTD-TT-64-962
TT 65-61822

Unclassified report

Unedited rough draft trans. of Vrachebnoe Delo (USSR) 1963, no. 10, p. 111-117.

Descriptors: (*Industrial medicine, Vibration), (*Pathology, Vibration), (*Vibration, Pathology), Tolerances (Physiology), Central nervous system, Vestibular apparatus, Skin, Bone, Muscles, Reflexes, Brain, Neurology, Blood vessels, Adrenal glands, Erythrocytes, Hypoxia, USSR.

Contents: Clinical symptoms of vibration sickness. Functional state of the cortex of the suprarenal gland in patients with vibration sickness of the second and third stage.

AD-612 441 Div. 16, 25

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
ANATOMIC AND HISTOCHEMICAL CHANGES IN SKIN AFTER LASER IRRADIATION,
by Elson B. Helwig, Wallace A. Jones, Jude R. Hayes, and Elmar H. Zeitler. 1963, 9p

Unclassified report

Pub. in Federation Proceedings (U.S.) v24 n1 ptIII suppl14 p583-591 Jan-Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pathology, Lasers), (*Lasers, Pathology), Histological techniques, Skin, Burns, Cells (Biology), Wounds and injuries, Enzymes, Proteins, Swine.

This preliminary study was designed to evaluate the laser-induced alterations of structure and enzyme activity in the mammalian skin at different energy exposures. (Author)

AD-612 442 Div. 16, 25

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
CENTRAL NERVOUS SYSTEM EFFECTS OF LASER RADIATION,
by Kenneth M. Earle, Stirling Carpenter, Uros Roessmann, Martin A. Ross, and J. R. Hayes. 1963, 11p

Unclassified report

Pub. in Federation Proceedings (U.S.) v24 n1 ptIII suppl14 pS129-39 Jan-Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pathology, Lasers), (*Lasers, Pathology), (*Brain, Wounds and injuries), Central nervous system, Hair, Color, Head, Burns, Hemorrhage, Skin, Mice, Rats, Monkeys.

Experiments were conducted to determine the effects of focused and unfocused laser radiation upon the scalp, cranium, and brain parenchyma of mice and rats. With an unfocused beam, no gross on microscopic lesions of the brain parenchyma were produced when the beam was directed onto the intact and unshaved scalp and cranium. With a beam focused on the unshaved scalp the skin was burned, but the cranium was intact. Subdural, subarachnoid, and focal intracerebral hemorrhage was produced in the brain parenchyma of mice but not of rats under these conditions. When the beam was aimed onto the head and focused so that the focal point would be inside the cranium and within the brain parenchyma along a track that corresponded with the focal depth, most of the mice died within minutes after such experiments when the output was about 20-40 joules. Similar lesions were produced in rats, but the rats were less affected generally and the results were not immediately fatal. The experiments suggest that the human hair, scalp, and skull would be sufficiently thick and dense to protect the brain from focused or unfocused laser radiation up to the 40-joule output and probably much higher energies, but the brains of small animals such as rats and mice can be severely damaged by a focused beam that is partially transmitted through the scalp and skull. (Author)

AD-612 443 Div. 16, 25

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
CONFERENCE ON BIOLOGIC EFFECTS OF LASER RADIATION (1st) WELCOME ADDRESS,
by Joe M. Blumberg. 1964, 1p

Unclassified report

Pub. in Federation Proceedings (U. S.) v24 n1 ptIII suppl14 pS1 Jan-Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pathology, Lasers), (*Lasers, Pathology), Wounds and injuries, Burns, Symposia.

AD-612 444 Div. 16, 25

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
THE PATHOLOGIST'S POINT OF VIEW,
by Robert E. Stowell. 1965, 4p

Unclassified report

Pub. in Federation Proceedings (U. S.) v24 n1 ptIII suppl14 pS170-2 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pathology, Lasers), (*Lasers, Pathology), Tissues (Biology), Cells (Biology), Absorption (Biology), Burns, Immunology, Antigen - antibody reactions, Pigments, Dyes, Blood vessels, Skin, Wounds and injuries, Symposia.

AD-612 445 Div. 16, 4

Army Research Inst. of Environmental Medicine, Natick, Mass.
CHARACTERIZATION AND SEPARATION OF SOME OF THE COORDINATION COMPOUNDS OF CHROMIUM AND ALUMINON,
by Gene R. Berube and George Clark. 1964, 8p

Unclassified report

Pub. in Stain Technology (U. S.) v39 n6 p329-36 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Biological stains, Chemical properties), (*Chromium compounds, Complex compounds), (*Complex compounds, Biological stains), Dyes, Carboxylic acids, Nitrates, Chemical analysis, Separation, Histological techniques, Cytochemistry.

Chromic nitrate and aluminon (ATA) react to form

highly colored lakes. Examination of these lakes by the Vosburgh and Cooper method has led to the identification of a pigment ((ATA)Cr(H2O)x) which is insoluble in water and absolute alcohol, a deep red anionic component ((ATA)6Cr(H2O)x)(-y), and a purplish-red cationic component ((ATA)Cr4(H2O)x)(+y). These components of lake were isolated and separated in the dry form. The anionic compound is apparently a simple coordination compound and can be used as a cytoplasmic stain while the cationic component is a chelate and can be used as a rather selective nuclear stain. In addition to these components, a number of other components were also found. Not only the ratio between chromium and aluminon but also the concentation of the reactants influences the formation of these different components. The amount of pigment formed is miximal with a molar ratio of 1 and a concentration of 0.01 M or 0.1 M. The anionic component is maximal with molar ratio of 1 Cr to 6 aluminon at the 0.1M concentration, the cationic component is maximal with a molar ratio of 4 chromium to 1 aluminon at the 0.1 M concentation. None of these are formed at 0.0001 M concentration but only a deep red-purple soluble compound at the 1:1 ratio, which was not further investigated. (Author)

AD-612 446 Div. 16, 4

Army Research Inst. of Environmental Medicine, Natick, Mass.

THE CATIONIC CHELATE OF CHROMIUM AND ALUMINON AS A SELECTIVE NUCLEAR STAIN, by Gene R. Berube, Margaret M. Powers, and George Clark. 1964, 2p

Unclassified report

Pub. in Stain Technology (U. S.) v39 n6 p337-338 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclei (Biology), Biological stains), (*Biological stains, Synthesis (Chemistry)), (*Chromium compounds, Complex compounds), (*Complex compounds, Biological stains), Dyes, Carboxylic acids, Ammonium compounds, Sulfates, Histological techniques, Cytochemistry.

The chelate is prepared by adding 4.5 gm of aluminon and 100 gm of chrome alum to 200 ml of distilled water, boiling gently for 20 min., filtering, and allowing the filtrate to drop into 3.5 liters of absolute alcohol. The alcoholic suspension is filtered and its precipitate is dried at room temperature. To prepare the staining solution 3 gm of chelate are dissolved in 100 ml of 3% HCl. Hydrated sections--paraffin, frozen, or celloidin--are stained for 30 min to 18 hr at room temperature. The stain is self-limiting and requires no differentiation. Since the stain is not removed by alcohol or weak acids, a large variety of counterstains may be used. (Author)

17. Metallurgy

AD-611 493 Div. 17

Northwestern Univ., Evanston, Ill.
STRAIN HARDENING AND STRESS DEPENDENCY OF DISLOCATION VELOCITY IN ALPHA-IRON ALLOYS WITH A DISPERSED PHASE,
by F. Felberbauer, E. P. Lautenschlager, and J. O. Brittain. 1964, 8p
Contract AF49 638 780
AFOSR 65-0162

Unclassified report

Pub. in Metallurgical Society of AIME. Transactions (U. S.) v230 p1596-1603 Dec 1964 (Copies not available to DDC or Clearinghouse customers.

Descriptors: (*Iron alloys, Metallography), Crystal lattice defects, Strain (Mechanics), Stresses, Deformation, Phase studies, Aluminum compounds, Oxides, Carbon, Temperature, Hardening, Tensile properties.

Experiments were made in alpha-iron specimens with controlled amounts of carbon and/or Al2O3. They were tested at various temperatures between 195 and 373K under a variety of conditions of concentration, strain rate, and quench aging. The resulting yield strength, flow strength, and strain hardening increased with addition of Al2O3. The parameter m, measured from changes in strain rate, was used to describe the stress dependency of the dislocation velocity. m was found to increase with additions of Al2O3, increasing carbon in solution, and with increasing temperature. When applied to a recent model for yielding based upon dislocation multiplication and velocity characteristics, the values of m alone did not successfully predict yielding for the materials of this investigation, but had to be adjusted with a consideration of the number of unlocked dislocations nucleated heterogeneously at discontinuities or inclusions. The change of yield strength with Al2O3 interparticle spacing appeared to obey a theory of Orowan. (Author)

AD-611 503 Div. 17, 4, 25

McMaster Univ., Hamilton (Ontario).
THE MECHANISM OF OXIDATION OF ZIRCONIUM IN THE TEMPERATURE RANGE 400-850C,
by R. J. Hussey and W. W. Smeltzer. 3 Feb 64, 4p
Grant AF AFOSR515 64
AFOSR 65-0184

Unclassified report

Pub. in Electrochemical Society. Journal (U. S.) v111 n11 p1221-24 Nov 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Zirconium, Oxidation), (*Oxidation, Reaction kinetics), (*Oxygen, Diffusion), Oxides, Crystal structure, Thermal properties, Metallography, Hardness, Mathematical models, Canada.

A study of the oxidation mechanism for zirconium in the temperature range 400-850C, based on examination of the oxide scale growth and oxygen gradients in the metal substrate, is reported. The oxidation kinetics at long times obeyed a parabolic rate equation which was best described in terms of a diffusion model for oxygen diffusion in both the oxide and metal. From the determination of the oxygen gradients, the diffusion constant was evaluated for oxygen diffusion in alpha-zirconium. (Author)

AD-611 538 Div. 17, 30
CFSTI Prices: HC$3.00 MF$0.75

Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy.
DEVELOPMENT OF SUPERIOR STEELS FOR PRECISION GYRO SPIN BEARINGS.
Final rept. for 3 Sep-31 Dec 63,
by D. R. Poirier, R. F. Polich, and M. C. Flemings. Dec 64, 55p
Contract AF33 615 1030, Proj. 7351, Task 735105
ML TDR-64-276

Unclassified report

Descriptors: (*Steel, Bearings), (*Bearings, Gyroscopes), (*Gyroscopes, Bearings), (*Metallurgy, Steel), Casting, Casting alloys, Carbon, Chromium, Manganese, Silicon.

Techniques are developed for casting thin section, rapidly chilled plates and bearing races of ferrous alloys. Reduced pressure is used to draw molten metal into a copper (or composite copper-refractory) mold. Primary dendrite arm spacings (and hence segregate spacings) obtained in these castings are extremely fine, ranging from 4 microns at the surface of a 0.10 cm. thick cast plate to 46 microns at the center of a 0.64 cm. thick plate. For comparison, segregate spacing in commercial bar stock from a consumable electrode ingot reduced by working as much as 115 to 1 was 45 microns. Segregate spacing is important since homogenization time necessary to reach a given low 'residual segregation index' varies inversely as the square of this spacing. A series of inner and outer bearing races were cast using procedures developed and heat treated to a residual segregation index less than 0.10. A series of inner and outer bearing races were also cast of 440C; discussion is included of effects of rapid solidification, and of homogenization, on structure of this material.

AD-611 555 Div. 17
CFSTI Prices: HC$3.00 MF$0.75

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
SCIENTIFIC AND TECHNICAL APPLICATIONS FORECAST, 1964, EXCAVATION.
Bibliography.
1964, 87p

Unclassified report

This is a bibliography for a report prepared by the Hughes Tool Company on Contract DA49 092AR030.

Descriptors: (*Mining engineering, Bibliographies), (*Civil engineering, Bibliographies), (*Earth-handling equipment, Bibliographies), (*Bibliographies, Mining engineering), Engineering, geology, Industrial equipment, Reviews.

This is a bibliography for a report prepared on the state of the art of excavation with particular emphasis on rock excavation underground. The state of the art report includes a technological forecast and a research plan. The bibliography contains a complete listing of significant literature on the subject of rock excavation underground. Those technical papers which were either repetitive, incomplete, or out of date were eliminated from the bibliography. Those very significant papers or reports are abstracted and a digest of them is included. The organization of the bibliography follows that general outline of the report for which it was made. Various chapters correspond to the main subject relative to this art. Except for Chapter 1 on geology, all chapters deal with specific methods of excavation.

AD-611 612 Div. 17, 25, 30

Pennsylvania State Univ., University Park.
Dept. of Engineering Mechanics.
A CONTINUOUSLY PUMPED ULTRA-HIGH VACUUM-SORPTION SYSTEM FOR THE PREPARATION OF HIGHLY ORDERED SINGLE-CRYSTAL METAL FOILS,
by L. E. Murr. 18 Sep 64, 7p
Grant AF AFOSR165 63
AFOSR 65-0279

Unclassified report

Pub. in British Journal of Applied Physics (Gt. Brit.) v15 p1511-5 1964 (Copies available only to DDC users). Revision of rept. dtd 12 Jun 64.

Descriptors: (*Vacuum apparatus, Vapor plating), (*Vapor plating, Foils), (*Foils, Metals), Single crystals, Vacuum pumps, Preparation, Electron microscopy, Epitaxial growth, Sorption, Evaporation, Nitrogen, Gold, Silver, Copper, Nickel.

A simple sorption-type ultra-high vacuum system has been devised in which thin metal foils can be prepared quickly, with perfection and measurable reproducibility. Ultimate vacuum of 3 X 10 to the minus tenth power torr had been obtained using liquid nitrogen around the sorption, and evaporation chambers. Ultimate vacuum of 3 X 10 to the minus tenth power torr has been routine prior to evaporation of gold, silver, copper, and nickel foils which ranged in thickness from 500-2000 a. High purity single crystal silver foils have been repeatedly prepared in this system which are suitable for direct analysis of deformations by transmission electron miscroscopy. A comparison is made between the order and quality of these ultra-high vacuum prepared foils with foils prepared using commercially available high vacuum equipment. (Author)

AD-611 800 Div. 17
CFSTI Prices: HC$3.00 MF$0.75

Case Inst. of Tech., Cleveland, Ohio. Dept. of Metallurgy.
CONTROL OF CAST GRAIN SIZE OF STEEL CASTINGS.
Interim rept. for 16 Aug 63-15 Aug 64,
by P. Wieser, N. Church, and J. F. Wallace. 15 Aug 64, 82p
Contract DA33 019AMC273Z, Proj. 1H024401A111
AMRA CR-64-04/1

Unclassified report

Descriptors: (*Steel, Castings), (*Castings, Grain structures (Metallurgy)), Casting, Additives, Microstructure, Tensile properties, Titanium, Cooling, Brittleness, Ductility, Niobium, Zirconium, Boron, Molding materials, Coatings, Carbides.

Techniques for the quantative evaluation of refinement of a high strength cast steel have been evolved and used to test the effectiveness of various inoculants in achieving microstructural and macrostructural refinement. Of the various materials tested only titanium additions produced significant refinement of both the micro and macrostructure. Comparison of the tensile properties of the basic steel with that of a refined steel shows that large additions (0.2-0.6 wt%) of titanium are sufficient to decrease the reduction in area sharply. Further data on castings partially refined with small (0.10 wt%) titanium additions indicate that an improvement in reduction of area is obtained compared to the results with a columnar structure solidified under similar thermal conditions. (Author)

AD-611 822 Div. 17, 12, 26
CFSTI Prices: HC$2.00 MF$0.50

IIT Research Inst., Chicago, Ill.
VANADIUM ALLOY STUDIES.
Final rept. for 1 Feb 64-1 Feb 65,
by F. C. Holtz. 24 Feb 65, 33p Rept. no IITRI-B6021-6
Contract NOw64 0239c, Proj. B6021

Unclassified report

See also AD-609 727.

Descriptors: (*Vanadium alloys, Creep), Niobium alloys, Tantalum alloys, Titanium alloys, Silicon alloys, Carbon alloys, Zirconium alloys, Rupture, Rolling (Metallurgy), Tensile properties, Deformation, Hafnium alloys, Hardness, Heat treatment, Silicon coatings, Heat-resistant metals and alloys.

This program is concerned with the improvement of rupture strength of vanadium alloys in the temperature range of 2000F to 2400F. Alloys based on V-60Cb, V-40Cb-30Ta, and V-50Ta were fabricated to 0.025 in. sheet and evaluated for mechanical properties at room temperature and 2200F. Arc-melted ingots exhibited excellent cold rollability once the cast structure had been broken down, and nearly all of the alloys had more than 20% tensile elongation at room temperature. The alloy V-40Cb-30Ta-1Ti-0. 235Si-0.075C had an ultimate tensile strength of 210,000 psi in the fully recrystallized condition. Room-temperature deformation of most of the alloys was accompanied by extensive twinning. Compositions based on V-50Ta were age hardenable. Creep-rupture data obtained under a 10,000 psi load at 2200F in vacuo showed that creep rates of the experimental alloys were much lower than the dilute Cb-1Zr alloy, but were somewhat higher than current commercial columbium alloys. Creep rates for some of the experimental alloys were 0.05 in/in/hr during a 2 hr exposure. (Author)

AD-611 832 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
DEFORMATION PROCESSING OF ANISOTROPIC METALS.
Progress rept. no. 2, 1 Sep-31 Oct 64,
by D. H. Avery and W. A. Backofen. Jan 65, 6p
Contract NOw65 0124d

Unclassified report

See also AD-608 527.

Descriptors: (*Titanium alloys, Deformation), (*Deformation, Metals), Aluminum alloys, Tin alloys, Sheets, Tensile properties, Stresses, Strain (Mechanics), Crystal structure, Crystal lattice defects, Metallography.

This report presents experimental yield loci and pole figures for four alpha titanium alloy sheets. The pole figures for these materials exhibited a wide range of crystallographic textures ranging from a tight texture about the sheet normal in 1/16-in thick 4 Al-1/4 O2 through a split texture along the transverse direction in 5 Al-2.5 Sn, to a texture with the basal-plane normals concentrated about the transverse direction in RC-70. R values in the rolling and transverse directions are shown as a function of strain. There is a clear relationship to texture. Presented are experimental yield loci, loci calculated from uniaxial R values and yield strengths by the Hill theory and calculated loci for isotorpic material. Agreement with the Hill theory appears to be good except for the 1/16-in thick 4 Al-1/4 O material in which texture hardening is considerably less than predicted; this may result from much more extensive twinning under the higher stresses in combined stress (plane-strain compression) loading. Implicit in calculations based on the Hill theory is an assumption of a fixed deformation mode; if the mode were to change under the high stresses for yield in texture hardened sheet, applicability of the theory would be restricted.

AD-611 836 Div. 17, 25
CFSTI Prices: HC$1.00 MF$0.50

Metals Research Lab., Brown Univ., Providence, R. I.
SURFACE VACANCY PITS AND VACANCY DIFFUSION IN ALUMINUM,
by B. K. Basu and C. Elbaum. Dec 64, 20p
Contract Nonr562 27

Unclassified report

Descriptors: (*Surface properties, Aluminum), (*Aluminum, Diffusion), (*Crystal lattice defects, Aluminum), Heat of activation, Grain boundaries, Nucleation, Density.

The width of regions depleted of vacancy pits, near various grain boundaries, were measured in aluminum for several temperatures of pit formation. These measurements, combined with the measured temperature-time relation during pit formation, allow one to evaluate the activation energy, E sub m, for vacancy diffusion. In the present study it was found that E sub m=17+1 Kcal/mole for aluminum. Boundaries with disorientation angles ranging from 2 degrees to 50 degrees were found to be equally effective sinks for vacancies, which indicates that this property is not sensitive to the details of boundary structure. A comparison of the pit density with the dislocation density shows that these pits do not necessarily nucleate at the intersections of dislocations with the surface. (Author)

AD-611 845 Div. 17, 14
CFSTI Prices: HC$3.00 MF$0.75

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Mary F. Banks. Feb 65, 55p
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Metals, Bibliographies), (*Bibliographies, Metals), Indexes, Metallography, Alloys, Cobalt alloys, Nickel alloys, Steel, Stainless steel, Beryllium, Titanium, Aluminum, Carbon, Graphite, Refractory materials, Ceramic materials, Oxides, Refractory metals, Vanadium, Platinum, Coatings, Composite materials, Metallurgy.

The 'DMIC Selected Accessions' is a current listing of selected documents and journal articles in an abstracted form on subjects within the technical scope of the Defense Metals Information Center (DMIC). It does not include restricted documents received by DMIC, such as Government classified reports, many of the progress reports issued to Government agencies, or company proprietary reports. It is published to supply current information and to provide an awareness of technical-information sources to Government contractors and subcontractors. Topics include: High-strength alloys, light metals, nonmetallics, refractory metals, coatings, applications and composites.

AD-611 873 Div. 17
CFSTI Prices: HC$4.00 MF$1.00

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
FRACTURE CHARACTERISTICS OF STRUCTURAL METALS.
Final rept. for 22 Jan 64-22 Jan 65,
by M. F. Amateau and E. A. Steigerwald. 22 Jan 65, 126p Rept. no. ER-5937-3
Contract NOw64 0186C

Unclassified report

Descriptors: (*Steel, Toughness), (*Fracture (Mechanics), Steel), Test methods, Thickness, Tool steel, Stainless steel, Low-temperature research, Titanium alloys, Aluminum alloys, Vanadium alloys, Chromium alloys, Nickel alloys, Cobalt alloys, Maraging steels, Tensile properties, Heat treatment, Microstructure, Stresses, Mathematical analysis.

An examination was conducted to determine the applicability of plane strain fracture toughness values, K sub IC, as a possible handbook design parameter. The program included: compilation of available data on plane strain fracture toughness, measurement of K sub IC for a variety of materials to supplement existing data, evaluation of influence of test method on K sub IC, and determination of certain processing history and section size effects on K sub IC. Fracture toughness measurements indicated that reasonable agreement can be obtained from tests conducted with various specimen geometries. Although K sub IC values reported from different laboratories showed considerable scatter, due presumably to variations between heats of material, definite differences in material classes could be distinguished. On this basis, K sub IC can serve as a relative rating parameter which would aid in material selection. In addition, quantitative estimates can also be made of the load-carrying capacity of components containing possible defects. (Author)

AD-611 877 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
CORROSION AS A PROBLEM TO THE AIR FORCE,
by Robert C. Drebelbis. Mar 65, 7p Rept. no. P-3080

Unclassified report

Presented to the Air Force Logistics Command Commanders' Conference, San Antonio, Texas, 12 Mar 65.

Descriptors: (*Corrosion, Air force equipment), (*Air force equipment, Corrosion inhibition), Protective treatments, Specifications, Maintenance.

The following recommendations are made to the Air Force to insure an effective corrosion control program: (1) Recognition of corrosion as a major problem at 'top side' in DOD and USAF, (2) Trained engineers to insure compliance with existing design, procurement, production, modification and maintenance directives at all levels, (3) Eliminate the small economics in procurement and production that later develop into costly maintenance and modification requirements, (4) Provide for and enforce proper cleaning and protection of weapon systems and ground support equipment in the field.

AD-611 992 Div. 17

Naval Research Establishment, Dartmouth (Nova Scotia).
POLARIZATION STUDIES OF ALUMINUM ALLOYS IN WATER AT 200 C AND 300 C,
by J. H. Greenblatt and A. F. McMillan.
8 May 62, 12p
Proj. D12 75 10 35

Unclassified report

Pub. in Corrosion (U. S.) v19 p146t-55t Apr 1963
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aluminum alloys, Corrosion), (*Corrosion, Aluminum alloys), Water, Resistance

(Electrical), Electron transitions, Oxides, Nickel alloys, Iron alloys, Silicon alloys, Voltage, Electric currents, Films, Temperature, Polarization.

Polarization studies on aluminum samples corroding in pure water at high temperature show that the oxide film on 2S aluminum has different properties than that on special alloys containing iron and nickel. The property affected most significantly is the electronic resistance of the film. While the film on 2S has a much greater electronic resistance in the anodic direction it has about the same or less resistance in the cathodic direction. The alloying elements appear to decrease the energy required for promoting electrons from the valence band of the oxide to the conducting band, giving the alloys their lower electronic resistance at current densities above 0.056 ma/sq cm. (Author)

AD-612 022 Div. 17, 25, 26
CFSTI Prices: HC$2.00 MF$0.50

Martin Co., Baltimore, Md.
EFFECT OF VACUUM ON THE MECHANICAL BEHAVIOR OF METALS.
Final scientific rept. for 1 Oct 63-1 Oct 64,
by I. R. Kramer, H. Shen, and S. E. Podlaseck. Oct 64, 42p Rept. no. Martin-RR-60
Contract AF49 638 946, Proj. 9782, Task 9782 02
AFOSR 64-2509
Unclassified report

See also AD-273 250.

Descriptors: (*Low-pressure research, Metals), (*Aluminum, Low pressure research), (*Vacuum, Metallurgy), Fatigue (Mechanics), Creep, Tensile properties, Single crystals, Iron, Alloys, Grain structures (Metallurgy), Strain (Mechanics), Heat of activation, Crystal structure, Surface properties, Fracture (Mechanics), Mechanical properties.

Effects of vacuum on the various mechanical properties of aluminum have been studied as a function of pressure, strain rate, crystallographic orientation, strain, specimen size and grain size. The results obtained from a series of creep, fatigue and tensile tests indicate that these parameters are intimately related to the magnitude of the effects observed in vacuum. Experimental results obtained in vacuum for the fatigue life, the coefficient of work-hardening, the change in activation energy and the activation volume are presented. The tensile properties of pure alpha iron have also been studied in vacuum, and the experimental data are presented. A theoretical surface effect model based on the concept of the 'surface debris layer' is proposed to interpret all the phenomena observed in this investigation. (Author)

AD-612 061 Div. 17, 14
CFSTI Prices: HC$4.00 MF$0.75

Solar, San Diego, Calif.
DEVELOPMENT OF PROTECTIVE COATINGS FOR TANTALUM BASE ALLOYS. TASK II. DEVELOPMENT OF TECHNOLOGY APPLICABLE TO COATINGS USED IN THE 3000 TO 4000 F TEMPERATURE RANGE.
Interim summary rept. for 1 Jun 63-31 May 64.
31 May 64, 104p
Contract AF33 657 11259, Proj. 7312, Task 731201
ML TDR-64-294
Unclassified report

See also AD-429 028.

Descriptors: (*Tantalum alloys, Protective treatments), (*Refractory coating, Oxides), Tungsten alloys, Oxidation, Hafnium compounds, Zirconium compounds, Ytterbium compounds, Additives, Thermal expansion, Diffusion, Compatibility, Titanium compounds, Tantalum compounds, Niobium compounds, High-temperature research.

The objective of this program was to develop new concepts and obtain experimental data which would be useful in a solution to the problem of the protection of tantalum from oxidation in the 3000 to 4000 F temperature range. Studies of bulk oxides were made to determine what modifier oxides would be required to form the optimum oxide coating. Thermal expansion measurements were performed on oxides from 1500 to 4000 F to determine the expansion match with tantalum. Electrical conductivity of an oxide was used as one indication of the diffusion characteristics of an oxide; hence its protective ability. Compatibility tests were also conducted with oxide, reservoir, barrier, and substrate material. The experimental results indicate that hafnia or hafnia modified with ZrO_2 and Y_2O_3 are suitable for continued investigation as coating materials. Hafnium appears to be a suitable reservoir material with tungsten as a barrier on tantalum. (Author)

AD-612 123 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
DENDRITIC MORPHOLOGY OF HIGH-STRENGTH STEEL CASTINGS,
by Paul J. Ahearn and Francis C. Quigley. 1964, 15p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Steel, Castings), (*Castings, Steel), Casting, Microstructure, Mechanical properties, Heat treatment, Metallography.

It was shown that microsegregation and dendritic size play a major role in determining mechanical properties of high-strength steel castings, and that microsegregation could be eliminated by means of 2500 F homogenization treatment. The resulting cast material exhibited mechanical properties identical to longitudinal properties of forged bar stock at the same strength level. Transverse forged properties were always inferior to longitudinal properties, thus the mechanical property superiority of this cast steel was established. (Author)

AD-612 159 Div. 17, 25
CFSTI Prices: HC$1.00 MF$0.50

Watervliet Arsenal, N. Y.
THE EFFECT OF PRESSURE ON THE STRUCTURE AND PROPERTIES OF METALS,
by T. E. Davidson, J. C. Uy, and A. P. Lee. 1964, 15p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Metals, Hydrostatic pressure), (*Hydrostatic pressure, Metals), Ductility, Deformation, Stresses, Zinc, Tungsten, Magnesium, Steel, Compressive properties, Tensile properties, Microstructure, Grain boundaries, Tin, Cadmium.

Under certain conditions, sufficiently high hydrostatic pressures can induce localized microscopic deformation in polycrystalline metals. Based on the examination of the effect of hydrostatic pressures to 26 kilobars on several cubic metals, the occurrence of such deformation, which in the early stages is localized along grain boundaries and increases in severity with increasing pressure, results from microscopic shear stresses arising from anisotropy in the linear compressibility. Pressure cycling to 20 kilobars slightly increases the flow stress of polycrystalline zinc. The tensile strength and ductility are not reproducibly affected. As has been observed in other materials, the ductility of magnesium, tungsten and 1045 steel with an untempered martensitic structure is drastically enhanced when fracture under a superimposed hydrostatic pressure. These materials are also known to undergo abrupt brittle-ductile transitions as a function of temperature, thus indicating that the pressure induced transition may be directly related to the atmospheric pressure phenomenon.

AD-612 194 Div. 17, 25
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif. Dept. of Materials Science.
DISLOCATION STRUCTURE OBSERVATIONS AT LUDERS FRONTS IN TANTALUM,
by Troy W. Barbee, Jr. and Robert A. Huggins.
Jan 65, 27p
Rept. no. SU-DMS-65-1, Technical rept. no. TR-12
Contract Nonr22534, Proj. NR031 577
Unclassified report

See also AD-609 000.

Descriptors: (*Metallography, Tantalum), (*Tantalum, Crystal lattice defects), (*Crystal lattice defects, Tantalum), Deformation, Surface properties, Grain boundaries, Density, Electron microscopy, Foils.

Dislocation configurations at Luders fronts in tantalum which deformed by non-uniform discontinuous yielding have been examined. No contrast structure was observed in grain boundaries of recrystallized material unless evidence of sample mishandling or incomplete recrystallization was observed. No classical pileups were seen although slip bands were found in regions just ahead of a Luders band. Dislocation source action at or near grain boundaries was observed at Luders fronts and within Luders bands. The dislocation density was observed to increase during the passage of a Luders front and grain boundaries were seen to rapidly develop contrast structure during the passage of a Luders front. These observations are discussed in light of current knowledge concerning the mechanism of discontinuous yielding. (Author)

AD-612 238 Div. 17

McMaster Univ., Hamilton (Ontario).
THE HIGH-TEMPERATURE OXIDATION KINETICS OF ZIRCONIUM,
by K. H. Akram and W. W. Smeltzer. 1962, 17p
Contract AF49 638 734
AFOSR 3559 Unclassified report
Pub. in Canadian Metallurgical Quarterly v1 n1 p41-57 Jul-Sep 1962 (Copies available only to DDC users).

Descriptors: (*Zirconium, Oxidation), (*Oxidation, Zirconium), Canada, High-temperature research, Dyanmics, Oxygen, Diffusion, Hardness, Metallography, Oxides, Scale, Titanium.

An investigation of the parabolic-linear oxidation of zirconium at 800 and 850C is reported. It was found that irrespective of the oxygen concentration in the metal substrate, parabolic kinetics represent the growth of the initial compact oxide scale while linear kinetics represent the later stages of growth. Metallographic observations indicated a transition from a compact to compact plus porous oxide scale. Accompanying hardness measurements demonstrated that oxygen penetrated into the metal via a steady concentration profile during linear oxidation. An exponential solution of the diffusion equation fitted to the concentration profile gave evaluations of the oxygen diffusion constant in the metal which are in good agreement with such evaluations from diffusion experiments. Several features of the oxidation kinetics of zirconium and titanium were correlated as further elucidation of the properties of metals in Periodic Subgroup IVB. (Author)

AD-612 329 Div. 17

James Forrestal Research Center, Princeton Univ., N. J.
SELF-DIFFUSION OF IRON IN NICKEL FERRITE,
by R. H. Condit, M. J. Brabers, and C. E. Birchenall. 11 Aug 59, 1p
Contract AF18 600 967
AFOSR 3579 Unclassified report
Pub. in Metallurgical Society of AIME. Transactions (U. S.) v218 p768 Aug 1960 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Iron, Diffusion), (*Nickel compounds, Ferrites), Iron alloys, Nickel alloys, Oxidation, Magnetite, Spinels, Phase studies.

Investigation was undertaken to test the hypothesis that nickel substituting for iron in magnetite might decrease the rate of spinel growth by reducing the iron mobility. Nickel plays several roles in reducing the oxidation rate of iron-nickel alloys. (1) It reduces progressively the stability range of wustite. (2) It reduces progressively the stability range of the iron-nickel spinel phase in terms of the variation in cation to anion ratio. (3) As shown in this investigation, it reduces the cation mobility in the spinel phase which is the faster growing phase in the absence of wustite.

AD-612 371 Div. 17
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOME PROPERTIES OF TERNARY: BETA SOLID SOLUTIONS OF ZIRCONIUM WITH NIOBIUM AND MOLYBDENUM
by Yu. F. Bychkov, V. V. Vlasov, and A. N. Rozanov. 18 Feb 65, 22p FTD-MT-64-423
TT 65-61813 Unclassified report
Edited machine trans. of Metallurgiya i Metallovedenie Chistykh Metallov (USSR) 1961, no. 3, p. 82-95.

Descriptors: (*Zirconium alloys, Solid solutions), (*Solid solutions, Zirconium alloys), (*Metallography, Zirconium alloys), Niobium alloys, Molybdenum alloys, Stability, Mechanical properties, Heat-resistance metals and alloys, Ductility, Oxidation, Pose studies.

It was shown that some alloys of the system Zr-Nb-Mo, having structure of beta-solid solution of increased stability, posses good mechanical properties, considerable heat resistance, good ductility and high oxidation resistance. (Author)

18. Military Sciences and Operations

AD-611 567 Div. 18, 26
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
RELATIONSHIPS FOR ESTIMATING USAF ADMINISTRATIVE AND SUPPORT MANPOWER REQUIREMENTS,
by A. J. Tenzer, O. Hansen, and E. M. Roque.
Jan 65, 46p Rept. no. RM-4366-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Air force personnel, Manpower studies), (*Personnel management, Air Force), (*Weapon systems, Manpower studies), Defense systems, Management planning, Costs, Strategic Air Command, Tactical Air Command, Air Defense Command, Air transportation, Maintenance personnel, Supervisory personnel, Statistical analysis, Tables.

A generalized method was developed for estimating administrative and support personnel requirements for the manning of future weapon/support systems. The study has been limited, thus far, to those bases of the Strategic Air Command (SAC), the Tactical Air Command (TAC), the Air Defense Command (ADC), and the Military Air Transport Service (MATS), which are located within the continental United States. A statistical examination of published USAF organization and manning data was carried out and it was found possible to estimate, for weapon systems of each of the major commands, the relationship between numbers of Operations and Maintenance (OM) personnel on the one hand, and numbers of administrative and support personnel, on the other. The specific estimating relationships for the major commands and for the major weapon systems are presented in detail in the section dealing with each command. (Author)

AD-611 764 Div. 18, 13
CFSTI Prices: HC$3.00 MF$0.75

Dunlap Associates, Inc., Darien, Conn.
REQUIREMENTS FOR LOCAL PLANNING TO COVER HAZARDS OF FALLOUT. VOLUME I.
Final rept., vol. 1.
Jan 65, 63p DRD-64-110, Vol. 1
Contract OCD OS63 161, Task 4531A

Unclassified report

Descriptors: (*Civil defense systems, Efectiveness), (*Shelters, Management planning), Population, Distribution, Traffic, Passenger vehicles, Fires, Fire safety, Hazards, Radioactive fallout, Linear programming, Connecticut.

The study concentrated upon developing effective plans for assigning shelters to population, and for bringing the population to the shelter. Two medium-sized towns in Connecticut, Stamford and Waterbury, were studied in detail. For each town, a study was made on the effectiveness of a number of plans of varying detail and complexity in getting people to shelter. In all plans it was assumed that enough traffic control would be set up to avoid blockages of traffic near shelters, and that the population would know to what shelter areas they had been assigned, and how they were supposed to get there. Two types of shelter assignment were made: the first was by census tract, the second by individual location. In the first, people from shelter-poor census tracts were directed to shelter-rich census tracts, according to a linear programming method aimed at minimizing distance traveled. In the second, a similar method was used to assign people to actual buildings. Studies were made of various speeds of movement to shelter and their effects upon rate at which the population was sheltered. Planning problems associated with primary and secondary fires were given cursory examination.

AD-611 765 Div. 18, 13
CFSTI Prices: HC$4.00 MF$0.75

Dunlap Associates, Inc., Darien, Conn.
REQUIREMENTS FOR LOCAL PLANNING TO COVER HAZARDS OF FALLOUT. VOLUME II. APPENDICES.
Final rept., vol. 2.
Jan 65, 111p DRD-64-110, vol. 2
Contract OCD OS63 161, Task 4531A

Unclassified report

See also AD-611 764.

Descriptors: (*Civil defense systems, Effectiveness), (*Shelters, Management planning), (*Traffic, Mathematical models), Population, Passenger vehicles, Mathematical analysis, Radioactive fallout, Hazards, Distribution, Time, Equations, Connecticut.

AD-611 871 Div. 18, 32
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
COUNTERINSURGENCY: PRINCIPLES AND PRACTICES IN VIET-NAM,
by James Farmer. Dec 64, 37p Rept. no. P-3039

Unclassified report

Edited transcript of a presentation given to the combined classes of the Counterinsurgency Course of the Naval Reserve Officers School at Long Beach, California, 25 November 1964.

Descriptors: (*Counterinsurgency, Vietnam), (*Vietnam, Counterinsurgency), Economic warfare, Guerrilla warfare, Tactical warfare, Costs, United States, China, Communists, Casualties, Military intelligence.

The criteria and indicators used for measuring success in counterinsurgency are discussed. Three phases of guerrilla warfare are described. It is concluded that a military victory is not possible for the Viet-Cong in South Viet-Nam as long as the U.S. is supporting the government. U.S. financial contribution is compared to U.S. and French costs of the 1945-1954 Indo-China war, and technical assistance and direct military support measures and their effects on the scarce resources--trained manpower, communications, transportation, and government infrastructures--are described. The principles of Viet-Cong tactics are listed and illustrated. The paper suggests the problems of motivating the Vietnamese soldier to fight a war which he no longer feels will be won in the near future. (Author)

AD-612 067 Div. 18
CFSTI Prices: HC$3.00 MF$0.75

Oklahoma State Univ., Stillwater.
A CONCEPT FOR NATIONAL DEFENSE.
Master's thesis,
by Porter Nelson Medley, Jr. May 65, 55p
Contract AF33 608 1097

Unclassified report

Descriptors: (*National defense, Weapon systems),

(*Defense systems, Costs), Management engineering, Economics, Deterrence, History, Air force budgets, Department of Defense, Theory.

The objective of this report is to develop a concept for resource allocation to achieve a more desirable cost effectiveness ratio for weapons of peace-keeping capability. The objective is not to criticize current concepts, policies, strategies, or methods. The purpose is purely exploratory -- an attempt to determine whether basic concepts or precepts of national defense are compatible with the present environment.

AD-612 254 Div. 18, 28
CFSTI Prices: HC$6.00 MF$1.50

American Institutes for Research, Pittsburgh, Pa. Inst. for Performance Technology.
LABORATORY INVESTIGATIONS OF SHELTER MANAGEMENT FACTORS,
by John F. Hale, Michael Rosenfeld, and Morris I. Berkowitz. Jan 65, 246p
Rept. no. AIR-D-93A-1/65-TR
Contract OCD PS64 57, Task 1519A

Unclassified report

Descriptors: (*Shelters, Management engineering), (*Civil defense personnel, Leadership), Civil defense systems, Nuclear warfare, Simulation, Social psychology, Group dynamics, Attitudes, Behavior, Confined environments, Stress (Psychology), Stress (Physiology), Decision making, Population.

A research program is reported in which several shelter exercises were conducted to investigate shelter management factors. The results of this program indicated that: (1) The most efficient operation of the shelter occured when the manager was present from the beginning of the exercise. (2) The effectiveness of operation in the absence of the trained manager depended upon the attitude toward the exercise of the emergent shelter leader, and upon the way in which he employed the in-shelter guidance materials. (3) A management style in which approximately equal attention is given to both technical and non-technical problem areas was much more effective than styles in which more attention is given to one of these areas at the expense of the other. (4) Complete darkness in a shelter was found to be tolerable for 24 hours by a group of volunteers from the research staff of A.I.R. This finding should be viewed, not as a base line, but rather as ceiling. That is, it is very unlikely that a complete 'shelter naive group' would behave nearly as calmly and assuredly as this group. (Author)

AD-612 431 Div. 18
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
STRATEGIC SURPRISE IN THE KOREAN WAR,
by H. A. DeWeerd. Jun 62, 36p
Rept. no. P-1800-1

Unclassified report

Descriptors: (*Military strategy, Far East), (*Military intelligence, Analysis), (*North Korea, Strategic warfare), (*South Korea, Strategic warfare), Aerial warfare, Nuclear warfare, China, Political science, United States, Reviews.

Three assumptions seem to have developed after Pearl Harbor about intelligence problems relating to surprise attack. One is that if intelligence teams collect everything, they will be reasonably sure not to miss key intelligence items. The second is that improved coordination between organizations and a wider sharing of intelligence data between individuals and organizations will help safeguard the United States against surprise. The third belief is that because the U. S. needs to have strategic warning in order to survive in the age of nuclear plenty, it will somehow get this warning and will make the necessary responses. The purpose of the paper is to urge a review of these assumptions in the light of the Korean war experience of the United States. It calls attention to the importance of the prevailing climate of military-political opinion in the evaluation of intelligence materials.

19. Navigation

AD-611 539 Div. 19, 25, 30
CFSTI Prices: HC$3.00 MF$0.75

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
THE VISILOG: A SYNTHETIC EYE.
Technical documentary rept. for 1 Jul 63-29 Feb 64, by Paul W. Charton and Erman E. Ferris. Jan 65, 76p
Contract AF33 657 11179
AL TDR-64-185

Unclassified report

Descriptors: (*Terrain avoidance, Optical scanning), (*Visual perception, Simulation), (*Bionics, Terrain avoidance), (*Pattern recognition, Terrain avoidance), Optical equipment, Optics, Navigational aids, Feasibility studies, Experimental data.

The VISILOG is an automatic obstacle avoidance machine whose principle of operation is based upon the analog of the visual senses. The subject of this investigation was a stationary slant-perceiving VISILOG, where the slant of a surface is measured by use of the texture density gradient as observed in the retinal plane. Texture density gradients may be measured by scanning a retinal plane image to determine the number of texture elements in a given scan and comparing the values for the near field and far field scans. Projected artificial textures which eliminate the emergent texture problem are analyzed as a method for extracting surface slant from the observed retinal plane patterns. Several VISILOG configurations are examined from the equipment point of view and the advantages and disadvantages of each are considered. Experimental verification of the VISILOG method of measuring surface slant is obtained and the effects of stochastic surfaces upon measurement accuracies demonstrated. The results obtained on this program indicate that the stationary slant measurement VISILOG is useful only in limited environmental situations.

AD-611 811 Div. 19, 8
CFSTI Prices: HC$4.00 MF$0.75

Bendix Corp., Southfield, Mich.
GROUND-BEACON ANTENNAS FOR MONITOR DISPLAY SYSTEM.
Final rept.,
by G. M. Peace, W. G. Jaeckle, and M. C. Horton.
Oct 64, 108p
Contract FA WA4559, Proj. 114 14D
SRDS RD-64-102

Unclassified report

Descriptors: (*Antennas, Landing aids), (*Runways, Beacons), (*Beacons, Antennas), (*Instrument landings, Display systems), (*Display systems, Monitors), Ground-controlled approach radar, Waveguide slots, Microwave equipment, Electromagnetic waves, Antenna configurations, Analog computers, Digital computers, Integral transforms, Fourier analysis, Beams (Electromagnetic), Parabolic antennas, Airborne, Design.

The results of a development program directed toward the design of improved ground-beacon antennas for use with an airborne monitor display system are presented. Design goals for the ground-beacon antennas are postulated to provide sufficient energy coverage in the runway approach corridor while minimizing energy in directions easily intercepted by reflecting obstacles. Synthesis technique studies were conducted to permit the calculation of an antenna aperture distribution required to radiate a shaped beam pattern. A synthesized aperture distribution was realized by employing complex slots in the broad face of rectangular waveguides. Experimental measurements verified the antenna design techniques. The improved ground-beacon antenna was realized by utilizing the complex-slotted waveguide array as a feed for a parabolic cylindrical reflector and as the basic element of a planar array. Flight test results established the improvement of these shaped-beam antennas over the previous antennas used as ground beacons. (Author)

AD-612 101 Div. 19
CFSTI Prices: HC$1.00 MF$0.50

Navy Underwater Sound Lab., New London, Conn.
PROCEDURE FOR MAINTAINING CONSTANT RANGE AND BEARING RATE BETWEEN MOVING VESSELS,
by Edward S. Eby. 2 Feb 65, 16p Rept. no. USL-639
Projs. S F001 03 16, SS041 001, Tasks 11224, 10752

Unclassified report

Descriptors: (*Targets, Ships), (*Ships, Tracking), Mathematical analysis, Bearings, Ranges (Distances), Sonar targets, Surface targets.

Equations are derived to describe the track, relative course, and speed for the experimental situation wherein a source ship is to travel in a circular path with respect to the position of a target under the assumption that the target is able to maintain constant course and speed but is unable to remain stationary. A restriction is given on the parameters of the solution in order to insure that the minimal radius of curvature along the track is greater than the 'turning radius' of the source ship. Three examples are given. (Author)

AD-612 295 Div. 19, 1, 33
CFSTI Prices: HC$2.00 MF$0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J. Experimentation Div.
ALTITUDE TRANSMISSION EQUIPMENT (ATE) EXPERIMENTATION.
Technical rept.,
by George H. Mahnken. Jan 65, 36p
Rept. no. RD-65-1
Proj. 242 006 03X108 30X

Unclassified report

Descriptors: (*Radar beacons, Data transmission systems), (*Altimeters, Data transmission systems), (*Altimeters, Data transmission systems), (*Data transmission systems, Altimeters), Flight testing, Radar beacons, Transmitter-receivers, Decoding, Air traffic control systems, Flight instruments, Airborne.

Laboratory and flight tests of the Altitude Transmission Equipment manufactured by Airborne Instruments Laboratory have been completed with satisfactory results. The ground decoding equipment used in conjunction with the flight tests, however, exhibited shortcomings when attempts were made to process garbled beacon reply codes. (Author)

AD-612 296 Div. 19, 1, 33
CFSTI Prices: HC$1.00 MF$0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J. Experimentation Div.
INVESTIGATION OF HIGH ALTITUDE REPORTING WITH AIR TRAFFIC CONTROL RADAR BEACON SYSTEM.

Technical rept.,
by George H. Mahnken and Felix Hierbaum. Jan 65,
19p Rept. no. RD-65-2
Proj. 242 006 03X108-30X

Unclassified report

Descriptors: (*Radar beacons, Data transmission systems), (*Altimeters, Data transmission systems), (*Data transmission systems, Altimeters), High altitude, Flight instruments, Air traffic control systems, Aircraft antennas, Jet planes, Commercial planes, Feasibility studies, Automatic, Airborne.

This document covers the high altitude phase of the test program on Altitude Transmission Equipment. In close cooperation with Northest Airlines, technical data and Air Traffic Control (ATC) operations analysis were obtained from the regularly scheduled flights of a Convair 880 which was instrumented with this equipment. For the most part, the technical data yielded expected results with the exception of the poor returns from inbound flights at long ranges. Operational feasibility was demonstrated whereby live altitude reporting from an equipped commercial airliner operating within the normal ATC environment was automatically available to the ground. (Author)

AD-612 362 Div. 19, 1, 33
CFSTI Prices: HC$4.00 MF$1.00

Airborne Instruments Lab., Inc., Deer Park, N. Y.
USE OF SELF-CONTAINED NAVIGATION AIDS IN DOMESTIC AIRSPACE.
Final rept.,
by E. N. Hooton, I. S. Wisepart, and P. Abramson.
Sep 64, 123p Rept. no. AIL-3523-1
Contract FA WA4680, Proj. 115 17R
SRDS RD-64-131

Unclassified report

Descriptors: (*Navigational aids, Civil aviation), (*Air traffic control systems, Navigational aids), (*Doppler navigation, Civil aviation), (*Inertial navigation, Civil aviation), Flight paths, All-weather aviation, Ground support equipment.

This report contains an introduction to general navigational principles as applied to the use of doppler and inertial systems. This is followed by a description of both systems concerning methods of operation (such as steering), accuracy, etc. In-flight errors must be checked by some external ground-based navigation aids and this is discussed in some detail. A simplified procedure is given using VORTAC. After a description of airline flight planning, the impact of self-contained navigation techniques on the air-traffic-control system is discussed relative to en-route flying and the terminal area. It is concluded that doppler and inertial can be used successfully in domestic operations and that, subject to certain procedures, every encouragement should be given to all operators (including general aviation) to use doppler, and later inertial, in the domestic airspace. (Author)

AD-612 423 Div. 19, 8
CFSTI Prices: HC$2.00 MF$0.50

Hazeltine Electronics Div., Hazeltine Corp., Little Neck, N. Y.
DOUBLE SIDE-BAND DOPPLER VOR EQUIPMENT.
Final rept.,
by R. L. Williams and J. F. Demoss. 16 Oct 64,
47p Rept. no. 10143
Contract FAA BRD376, Proj. 115 2 1D

Unclassified report

Descriptors: (*Radio equipment, Radio navigation), (*Doppler systems, Radio equipment), (*Radio navigation, Radio equipment), Sidebands, Phase-locked systems, Phase control devices, Control, Circuits, Power supplies, Distributors, Wiring diagrams.

This report describes the design and fabrication of a Double-Sideband Doppler VOR Transmitter and Distributor. The equipment is intended to modify present Doppler VOR ground station equipment to provide the radiation of a double-sideband variable-phase signal which approximates the radio signal of the conventional VOR ground station but using the Doppler technique. The transmitting equipment consists of two sideband generators individually phase-locked to the carrier (one 9960 cps higher in frequency and the other 9960 cps lower in frequency) individual automatic level control circuits, power supplies, and associated control circuits. Testing by the contractor indicated that specifications on frequency, phase, and output level stability were met or exceeded. It was concluded that the feasibility of individual automatic phase control of side-band generators as a method of providing satisfactory r-f signals for a double-sideband Doppler VOR system has been demonstrated.

20. Nuclear Physics and Nuclear Chemistry

AD-611 466 Div. 20

Sydney Univ. (Australia).
THE PRODUCTION AND PROPERTIES OF MESONS AT HIGH ENERGIES,
by F. A. Brisbout, C. Gauld, J. Lehane, C. B. A. McCusker, and J. Malos. 12 May 61, 16p
Contract AF49 638 842
AFOSR TN-60-1379

Unclassified report

Pub. in Nuclear Physics (Netherlands) v26 n4 p634-48 1961 (Copies available only to DDC users).

Descriptors: (*Pions, Production), (*Meson reactions, Pions), Energy, Momentum, Proton reactions, Meson scattering, Mesons, Pair production, Bremsstrahlung, Electrons, Photographic emulsions, Radiation measurement systems, Gamma rays.

Results from a 10 1 stack of Ilford K5 emulsion flown to 38.4 km are presented. It is shown that the transverse momentum spectrum of the secondary particles of jets has two peaks at about 0.4 and 2.0 GeV/c respectively, and possibly a third peak at about 8 GeV/c; that the interaction cross section of secondary pions is considerably smaller than the geometric value; that the interactions they produce in emulsions have a lower average multiplicity than proton produced interactions in the same energy range; and that the number of particles per interaction close to the forward direction is less than that expected from extrapolation from slightly greater angles. The results are compared with those of other experiments and their meaning discussed. (Author)

AD-611 484 Div. 20

Hebrew Univ., Jerusalem (Israel).
MOSSBAUER EFFECT IN Ta181,
by S. G. Cohen, A. Marinov, and J. I. Budnick.
28 Jul 64, 3p
Contract AF61 052 347
AFOSR 65-0158

Unclassified report

Pub. in Physics Letters (Netherlands) v12 n1 p38-40 Sep 1 964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mossbauer effect, Tantalum), (*Tantalum, Mossbauer effect), Isotopes, Resonance absorption, Nuclear magnetic resonance, Quadrupole moments, Absorption spectrum, Line spectrum, Nuclear spectroscopy, Israel.

AD-611 485 Div. 20, 25

Institute for Advanced Study, Princeton, N. J.
UNITARITY BOUNDS OF THE SCATTERING AMPLITUDE AND THE DIFFRACTION PEAK,
by S. W. MacDowell and A. Martin. 23 Mar 64, 3p
Grant AF AFOSR42 64
AFOSR 65-0149

Unclassified report

Pub. in The Physical Review v135 n4B pB960-2 Aug 24 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear scattering, Diffraction), (*Diffraction, Nuclear scattering), Nuclear cross sections, Quantum mechanics, Nuclear models, Inequalities, Momentum.

From unitarity alone a lower bound for the derivative of the absorptive part of the forward scattering amplitude with respect to the momentum transfer is obtained, in terms of the elastic and total cross sections. Comparison with high-energy scattering experiments shows that the actual value of this derivative is rather close to the lower bound, which provides some information on the partial-wave distribution. Our result can also be used to obtain consistency requirements on theoretical models. If Regge behavior is assumed for high-energy scattering one can show that either a'(0)>or=epsilon>0 or a(t)=const. (Author)

AD-611 490 Div. 20, 25

Institute for Advanced Study, Princeton, N. J.
UPPER BOUNDS FOR THE SCATTERING AMPLITUDE AT HIGH ENERGY,
by A. Martin, J. J. Loeffel, and T. Kinoshita.
11 May 64, 19p
Grant AF AFOSR42 64
AFOSR 65-0152

Unclassified report

Pub. in The Physical Review v135 n6B pB1462-82 Sep 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear scattering, Mathematical analysis), (*Quantum mechanics, Nuclear scattering), Nuclear spins, Energy, Momentum, Functions, Harmonic analysis, Special functions (Mathematical), Series, Scattering.

Constraints imposed by unitarity and analyticity on the high-energy behavior of scattering amplitudes are studied in detail. The Froissart bound at nonforward (and nonbackward) angle is improved by two different methods: One is based on the analyticity in complex costheta plane, and the other on the analyticity of the partial-wave amplitude in the complex angular-momentum plane. It is also shown that the Froissart bound at theta = 0 or pi cannot be improved insofar as one does not impose restrictions on the scattering amplitude other than unitarity and the analyticity in the costheta plane. The scattering of particles with spin is discussed briefly. (Author)

AD-611 491 Div. 20, 15, 25

Institute for Advanced Study, Princeton, N. J.
NUMBER OF SUBTRACTIONS IN FIXED-TRANSFER DISPERSION RELATIONS,
by Y. S. Jin and A. Martin. 17 Apr 64, 3p
Grant AF AFOSR42 64
AFOSR 65-0151

Unclassified report

Pub. in The Physical Review v135 n6B pB1375-7 Sep 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear scattering, Particles), (*Quantum mechanics, Nuclear scattering), Perturbation theory, Integrals, Complex variables.

Assuming the minimal requirements necessary to derive the Froissart bound, the number of subtractions for the fixed-momentum-transfer dispersion relation in the unphysical region 0<t<4 mu squared turns out to be 2.

In the proof, the positiveness of all the derivatives of absorptive part with respect to t at t=0 is used. Physical implications and applications of this result are briefly discussed. (Author)

AD-611 500 Div. 20, 25

Hebrew Univ., Jerusalem (Israel).
STUDIES OF THE INTERNAL FIELDS ACTING ON NUCLEI IN FERROMAGNETIC AND PARAMAGNETIC SOLIDS, USING RECOIL-FREE RESONANCE, ABSORPTION (MOSSBAUER EFFECT),
by R. Bauminger, S. G. Cohen, A. Marinov, and S. Ofer.
1962, 2p
Contract AF61 052 347
AFOSR 4046
Unclassified report

Pub. in Physical Society of Japan. Journal v17 (suppl. B-I) p123-4 1962 (Copies available only to DDC users).

Descriptors: (*Ferromagnetic materials, Electromagnetic fields), (*Paramagnetic materials, Electromagnetic fields), (*Mossbauer effect, Field theory), Magnetic fields, Electric fields, Resonance absorption, Absorption spectrum, Atomic orbitals, Nuclear energy levels, Dysprosium, Iron, Israel.

Recoil-free gamma ray absorption spectra have been observed in ferromagnetic and paramagnetic solids containing nuclei of Fe57 and Dy161, using radioactive sources of Co57 and Tb161. The hyperfine Zeeman splittings in ferromagnetic materials permit a determination of the effective magnetic field at the nuclei. The effective magnetic field, H, at Fe57 nuclei in yttrium iron garnet, dysprosium iron garnet and in some spinel ferrites have been measured at 300K and 85K. Measurements on Fe3O4 confirm Verwey's hypothesis of a fast exchange between ferrous and ferric ions in the octahedral sites above the transition temperature. H at Dy161 in dysprosium iron garnet has been found to be 3,500,000 oe at 85K and 750,000 oe at 300K and is proportional to the Dy sub-lattice spontaneous magnetization. A large temperature dependent quadrupole interaction in DIG has been observed, which is ascribed to an effective electric field gradient at the Dy nuclei produced by the partially aligned orbitals of the 4f electrons, and thus correlated with the spontaneous magnetization. (Author)

AD-611 560 Div. 20, 8
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass Inst. of Tech., Lexington.
HIGH POWER CYCLOTRON RESONANCE SWITCH.
Summary rept. for 15 Jun 62-1 Feb 63.
13 May 63, 33p
Contract AF19 604 7400
Unclassified report

Subcontracted to Bomac Div., Varian Associates, Beverly, Mass.

Descriptors: (*Cyclotrons, Electronic switches), (*Electronic switches, Cyclotrons), Resonance, Electric fields, Radiofrequency, Voltage, Magnetic fields, L-band, Cavity resonators, Magnets, Radiofrequency power, Magnetrons, Electric discharges.

The objective of this program is to demonstrate experimentally the two fundamental prerequisites of a high power cyclotron resonance switch. Namely; (a) the ability of the switch to hold off the required r.f. electric fields and (b) a great reduction of the breakdown voltage upon application of the magnetic field appropriate to cyclotron resonance. This investigation has demonstrated experimentally that the applied magnetic field raises the hold-off power of the tubes, and that the tube holdoff power depends on the tube geometry. The fact that the barrel tube held off the required high power is not considered complete proof that the goal was attained since there is the possibility that current arcing might have detuned the cavity.

AD-611 599 Div. 20

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Physics.
IMPROVED CALIBRATION OF A Ra Be(alpha, n) AND AN Am Be(ALPHA, N) NEUTRON SOURCE,
by K. W. Geiger and A. P. Baerg. 16 Nov 64, 6p
Rept. no. NRC-8258
Unclassified report

Pub. in Canadian Journal of Physics v43 p373-8 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Neutrons, Sources), (*Radioactive isotopes, Calibration), (*Neutron flux, Radioactive isotopes), Radium, Beryllium, Americium, Isotopes, Neutron capture, Neutron spectrum, Neutron detectors.

AD-611 609 Div. 20

University Coll., London (England).
s-WAVE PION-NUCLEON SCATTERING AND PION-PION INTERACTIONS,
by J. Hamilton, T. D. Spearman, and W. S. Woolcock.
13 Sep 61, 40p
Contract AF61 052 468
AFOSR 2129
Unclassified report

Pub. in Annals of Physics (U. S.) v17 n1 p1-40 Jan 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pions, Nuclear scattering), (*Nuclear scattering, Pions), (*Nucleons, Pions), Phase shift, Integrals, Mathematical models, Quantum mechanics, Nuclear energy levels.

It is shown, using a partial wave dispersion relation, how the low-energy s-wave pion-nucleon interactions can be separated into long range and short range parts. The phase shifts used in deriving previously reported results are examined, and a critical survey of the errors and uncertainties in the method is given. The results show how s-wave pion-nucleon scattering can be resolved into four main constituents: core scattering, T = 0 and T = 1 pion-pion scattering, and rescattering. The conclusions on T = 0 and T = 1 pion-pion scattering are compared with other experimental and theoretical data, and are shown to be in reasonable agreement. (Author)

AD-611 633 Div. 20
CFSTI Prices: HC$3.00 MF$0.75

Research Triangle Inst., Durham, N. C.
THE EFFECTIVENESS OF RADIOLOGICAL COUNTERMEASURES IN ACCELERATING POSTATTACK RECOVERY,
by Joseph D. Douglass, Jr. 29 May 64, 57p
Research Memo. no. RM-OU-156-5
Contract ACD PS64 56, Proj. OU156, Task 3233B
Unclassified report

Descriptors: (*Radiological contamination, Countermeasures), Radioactive fallout, Dose rate, Intensity, Recovery, Effectiveness, Time, Graphics, Equations.

This report develops the relationships that determine the extent to which radiological countermeasures could accelerate the postattack recovery process. The recovery of an activity is specified in terms of the duration of the activity, the time when the activity is to commence, the allowable dose received by the activity personnel, the fallout field characteristics, and the effect of the countermeasure on these field characteristics. The acceleration of the recovery is specified by the difference between the time when the activity may commence if the countermeasure is not employed and the time when the activity may commence if the countermeasure is employed. This difference, the time saved, is analyzed as a function of the other parameters. Finally, the analysis is examined in a general manner to determine the range of situations where countermeasures appear to be potentially most valuable. (Author)

AD-611 635 Div. 20, 25

Queen's Univ., Belfast (Northern-Ireland).
THE PROBABILITY OF ELECTRON CAPTURE AT FIXED SCATTERING ANGLES IN H+-H COLLISIONS,
by Francis J. Smith. 2 Sep 64, 12p
Contract N62558 3634

Unclassified report

Pub. in Physical Society. Proceedings (Gt. Brit.) v84 p889-99 1964 (Copies available only to DDC users).

Descriptors: (*Electron capture, Probability), (*Proton scattering, Electron capture), Differential cross sections, Protons, Hydrogen, Damping, Quantum mechanics.

The wave treatment of electron capture is used in calculations of differential cross sections for H(+)-H collisions at different scattering angles and at energies between 100 ev and 2 kev. It is shown that the impact parameter treatment is inaccurate for calculations of differential capture cross sections except at high energies and large scattering angles, that is above about 5 kev when the scattering angle of the incident proton is 0.5 deg and above about 0.5 kev when the scattering angle is 5 deg. At small angles and energies the two-state wave approximation shows considerable damping of the oscillations in the probability of electron capture, in qualitative agreement with experiment. The damping due to this wave effect is compared with that due to 2p sigma sub u - 2p p. sub u coupling (based on calculations made by Bates and Williams in 1964), and it is shown that the wave effect causes more damping especially at low energies. The two-state wave treatment is corrected for 2p sigma sub u - 2p p. sub u coupling in the case of 3 deg scattering and compared with the experimental results of Lockwood and Everhart obtained in 1962. Closer agreement with experiment is obtained than hitherto. The effect of rainbow scattering, important at low energies and for small scattering angles, is also discussed. (Author)

AD-611 645 Div. 20, 16

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Physics.
SPECTRA OF THE INTERNALLY SCATTERED RADIATION FROM LARGE CO 60 SOURCES USED IN TELETHERAPY,
by J. H. Aitken and W. H. Henry. 9 Jan 64, 13p

Unclassified report

Pub. in International Journal of Applied Radiation and Isotopes (England) v15 p713-24 1964 (Copies available only to DDC users).

Descriptors: (*Radiotherapy, Cobalt), (*Gamma-ray scattering, Gamma-ray spectra), (*Gamma-ray spectra, Cobalt), Continuous spectrum, Line spectrum, Shielding, Nuclear radiation spectrometers, Radioactive isotopes.

Because of internal scattering and degradation of the 1.33 and 1.17 MeV quanta, the beam of radiation from a Co60 teletherapy unit includes a continuous spectrum extending well below 1 MeV. The form of this spectrum below 1 MeV and its intensity relative to the radiation above 1 MeV have been investigated for sources of various dimensions. The influence of the material around the source, the relative spectral contributions of different parts of the source, and the spectra from bare sources outside the teletherapy head have also been studied. Methods of designing source and head to minimize the radiation below 1 MeV may be inferred from the graphs. (Author)

AD-611 663 Div. 20, 15

Army Electronics Labs., Fort Monmouth, N. J.
INEQUALITIES RELATING THE NEAREST-NEIGHBOR SPIN CORRELATION AND THE MAGNETIZATION FOR THE HEISENBERG HAMILTONIAN,
by Harold Falk. 28 Apr 64, 3p

Unclassified report

Pub. in Journal of Mathematical Physics (U. S.) v5 n10 p1478-80 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Inequalities, Nuclear spins), (*Nuclear spins, Hamiltonian), (*Calculus of variations, Inequalities), Perturbation theory, Ferromagnetism, Antiferromagnetism, Matrix algebra, Quantum mechanics.

Convexity properties of the free energy are used to obtain inequalities relating the nearest-neighbor spin correlation and the magnetization for the Heisenberg Hamiltonian. (Author)

AD-611 723 Div. 20

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
g VALUE IN ALKALI-METAL CONDUCTION-ELECTRON SPIN RESONANCE,
by Arthur Bienenstock and Harvey Brooks. 10 Jun 64, 21p
Contract SD88
ARPA 13

Unclassified report

Pub. in Physical Review (U. S.) v136 n3A pA784-A802 Nov 2, 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Alkali metals, Nuclear energy levels), (*Nuclear energy levels, Alkali metals), Quantum mechanics, Nuclear spins, Nuclear resonance, Atomic orbitals, Atomic properties, Electron transitions, Power series, Vector analysis, Integrals, Differential equations, Boundary value problems, Polarization.

A method for examining the convergence of expansions of wave functions for nearly free electrons is presented. It is shown that Bardeen-type expansions of alkali-metal conduction-electron wave functions converge sufficiently slowly so that it is necessary, when calculating the value of a physical quantity to any given power of k, to include all terms of all orders in u(k,r) which contribute to that power. Consequently, wavefunction expansions to third

order in k which include the effects of spin-orbit interaction to first order are derived, in the spherical approximation, for these metals. Using these wave functions in Yafet's equation, the g shift, to second order in k , is expressed in terms of radial wave functions. The radial functions are evaluated numerically using the quantum defect method under four different approximations: (i) With and without the so-called 'polarization correction' and (ii) with and without a term in the potential corresponding to an approximate self-consistent Hartree field due to the presence of other conduction electrons within the Wigner-Seitz sphere. The best agreement with experiment is obtained when the 'polarization correction' is neglected and the Hartree term included. In this approximation the effective mass ratio, m/m is considerably closer to unity in the heavier alkali metals than was predicted by earlier calculations. (Author)

AD-611 855 Div. 20, 12
CFSTI Prices: HC$4.00 MF$1.00

Douglas Aircraft Co., Inc., Santa Monica, Calif.
SECONDARY NUCLEONS PRODUCED IN HIGH ENERGY NUCLEAR REACTIONS,
by W. R. Yucker. Dec 64, 123p
Douglas rept. no. SM-46334
Unclassified report

Descriptors: (*Space flight, Shielding), (*Shielding, Secondary emission), (*Secondary emission, Shielding), (*Nucleons, Secondary emission), Monte Carlo method, Nuclear scattering, Nuclear cross sections, Nuclei, Evaporation, Neutron reactions, Proton reactions, Inelastic scattering.

The report is the result of a study to provide some of the basic nuclear data necessary for space radiation shielding calculations. Both experimental data and information generated by Monte Carlo calculations are used in the analysis. Empirical relations derived from these data are presented for non-elastic cross sections, cascade yields, residual nuclear excitation, evaporation yields and secondary energy and angular distributions. These results provide a model for calculating the cross sections for production of secondary nucleons by high energy nucleons striking complex nuclei. (Author)

AD-611 897 Div. 20

California Inst. of Tech., Pasadena.
ELASTIC SCATTERING OF DEUTERONS BY LITHIUM-7,
by J. L. C. Ford, Jr. 3 Aug 64, 8p
Contract Nonr22047
Unclassified report

Pub. in Physical Review (U.S.) v136 n4B pB953-60 Nov 23 1964 (Copies not available to DDC or Clearinghouse customers). Revision of rept. dated 6 Jan 64.

Descriptors: (*Deutrons, Elastic scattering), (*Lithium, Deuteron bombardment), Deuteron cross sections, Nuclear energy levels, Excitation, Nuclear resonance, X-rays, Nuclear particles, Deuteron beams.

The elastic scattering of deuterons by lithium-7 nuclei was investigated in the energy region from E(d)=0.40 to 1.80 MeV. The scattering cross sections tended to be lower than the Rutherford value below about 0.85 MeV, and then rise to values several times the Rutherford value for higher energies. A conspicuous anomaly in the scattering cross section occured near 1 MeV, where the reaction cross sections also show resonances, while there was no prominent scattering anomaly corresponding to the reaction resonances near 0.80 MeV. The apparent presence of broad overlapping energy levels in the compound nucleus, together with the incomplete nature of the data on the various reaction cross sections, has prevented a detailed theoretical analysis of the elastic scattering over the energy region investigated. An s-wave analysis, however, does provide an adequate fitting of the scattering angular distributions up to about 1 MeV, and the relatively sharp scattering anomaly near 1 MeV appears to be due to p-wave deuterons. When elastic-scattering data over a wider energy region and more accurate reaction cross sections become available, it may be possible to extract more quantitative information from the present data. (Author)

AD-611 907 Div. 20

Illinois Univ., Urbana.
ANALYSIS OF LOW-ENERGY K(+)-p ELASTIC SCATTERING,
by A. D. Martin and T. D. Spearman. 27 Jul 64, 13p
Unclassified report

Pub. in Physical Review (U. S.) v136 n5B pB1480-92 Dec 7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*K mesons, Elastic scattering), (*Protons, K mesons), (*Elastic scattering, K mesons), Perturbation theory, Phase shift, Spin, Selection rules, Quantum mechanics, Differential cross section, Pion, Nucleons.

An analysis based on dispersion-relation techniques is applied to experimental data for K(+)-p elastic scattering. Particular reference is made to the 'force of longest range' due to the exchange of low-mass pion pairs with isospin I=0. The effect of this exchange force can be calculated in terms of only one unknown parameter lambda which may essentially be chosen to be a linear combination of the K-pion scattering lengths. The other forces of shorter range are described by further undetermined parameters. The K(+)-p differential cross section is calculated in terms of these parameters and a minimization procedure is used to obtain a fit to the experimental data. A good fit is obtained for a well-defined set of values of the parameters. In particular, lambda is well determined. A sum rule for K pion scattering is used to calculate a further relation between the K-pion scattering lengths so that the value of each of these is obtained. (Author)

AD-611 955 Div. 20

Queen's Univ., Belfast (Northern Ireland).
ELECTRON CAPTURE BY HELIUM IONS IN NEUTRAL HELIUM,
by R. McCarroll and K. Prasad. 22 Jul 64, 8p
Contract N62558 3634
Unclassified report

Pub. in Physical Society. Proceedings (Gt. Brit.) v84 p807-13 1964 (Copies available only to DDC users).

Descriptors: (*Electron capture, Helium), (*Helium, Electron capture), Ions, Electron bombardment, Atomic orbitals, Electron transitions, Hamiltonian, Differential equations.

The cross section for electron capture by helium ions in helium is derived using an expansion based on atomic orbitals. Full account is taken of momentum transfer and of the non-orthogonality of the initial and final state wave functions. Computations have been performed for the range of energies from 100 ev to 1 MeV. (Author)

AD-611 967 Div. 20, 25

Stanford Univ., Calif.
INTERNAL CONVERSION COEFFICIENTS OF Ni56,
by R. C. Jenkins and W. E. Meyerhof. 20 Apr 64,
15p
AROD 3269 4

Unclassified report

Pub. in Nuclear Physics (Netherlands) v58 p417-31 1964 (Copies available only to DDC users).
Research supported in part by National Science Foundation, Washington, D. C. and Office of Naval Research, Washington, D. C.

Descriptors: (*Internal conversion, Nickel), (*Nickel Internal conversion), (*Gamma-ray spectroscopy, Internal conversion), Decay schemes, Isotopes, Excitation, Nuclear shell models, Gamma rays, Multipolarity, Scintillation counters, Beta-ray spectroscopy.

The internal conversion coefficients of the 0.164, 0.272 and 0.484 MeV gamma rays of Ni56 have been determined utilizing a scintillation gamma ray spectrometer and a Siegbahn-Satis intermediate-image beta-ray spectrometer. Respective conversion coefficients of 0.12 ± 0.001, 0.0034 ± 0.0002 and 0.0015 ± 0.00015 were found. Comparison with theoretical conversion coefficients expected for pure multipole transitions and use of the Weisskopf single-particle estimates for the gamma-ray transition probabilities lend considerable support to an analysis of the low-excited states of Co56 in terms of a simple shell model for an odd nucleus. (Author)

AD-612 013 Div. 20, 2, 18
CFSTI Prices: HC$4.00 MF$1.00

Lockheed Missiles and Space Co., Palo Alto, Calif.
ANALYSIS AND EVALUATION OF MEASUREMENTS OF GEOMAGNETICALLY TRAPPED ELECTRONS FROM HIGH-ALTITUDE NUCLEAR EXPLOSIONS. Final rept.,
by William L. Imhof, Edward E. Gaines, David R. King, George H. Nakano, and Ray V. Smith. Jul 64,
136p Rept. no. 3-25-64-1
Contract DA49 146XZ205, Task 07 101
DASA 1540

Unclassified report

Descriptors: (*Nuclear explosions, High altitude), (*Electron density, Upper atmosphere), (*Artificial radioactivity, Upper atmosphere), Geophysics, Explosion effects, Injection, Electrons, Electron capture, Terrestrial magnetism, Radiation measurement systems, Space environmental conditions, Military strategy.

The Starfish detonation on 9 July 1962 dramatically demonstrated, by producing significant damage to several space missions, the important military implications of geomagnetically trapped electrons. Results on the spatial distribution, spectrum, angular distribution, and time history of electrons artificially injected and trapped in the earth's field as a result of not only the Starfish detonation but also some Soviet high-altitude detonations are presented.

AD-612 029 Div. 20
CFSTI Prices: HC$2.00 MF$0.50

Radiation Research Associates, Inc., Fort Worth, Tex.
GAMMA-RAY ENERGY AND ANGULAR DISTRIBUTIONS NEAR THE AIR/GROUND INTERFACE FROM PLANE FALLOUT AND POINT Co60 SOURCES,
by R. L. French and C. W. Garrett. 1 Jun 64,
30p Rept. no. RRA-M42
Contract DA49 146XZ254

Unclassified report

Paper to be presented at the 1964 Annual Meeting of the Health Physics Society (Cincinnati, Ohio, Jun 15-18, 1964).
See also AD-612 030, AD-612 032.

Descriptors: (*Radioactive fallout, Gamma rays), (*Gamma-ray scattering, Monte Carlo method), (*Monte Carlo method, Gamma-ray scattering), Sources, Cobalt, Isotopes, Distribution, Photons.

Monte Carlo techniques were applied in a detailed study of the gamma radiation environment three feet above the air/ground interface due to two types of gamma-ray sources: (1) fallout uniformly distributed on the ground surface, and (2) a Co60 point source also three feet above the ground at separation distances of 100 to 800 feet. In each case, the scattered and direct-beam fluxes were computed in each of ten receiver energy intervals between 0.04 and 3.5 Mev and eighteen equal receiver angle intervals between 0 (nadir) and 180 degrees (Zenith). All results were integrated over azimuthal angle at the receiver to reflect distribution in polar angle only. The source energy was used as a parameter in the fallout calculations and the results thus computed for each of ten different source energies may be weighted and combined to obtain data for fallout of any desired age. Comparisons of the Monte Carlo data with measured data and with other calculated data, both for fallout and for Co60 point sources, show favorable agreement. (Author)

AD-612 030 Div. 20
CFSTI Prices: HC$3.00 MF$0.75

Radiation Research Associates, Inc., Fort Worth, Tex.
GAMMA-RAY ENERGY AND ANGULAR DISTRIBUTIONS ABOVE AN INFINITE FALLOUT FIELD,
by R. L. French. 1 May 64, 96p Rept. no. RRA-T43
Contract DA49 146XZ254 Unclassified report

See also AD-612 029.

Descriptors: (*Radioactive fallout, Gamma rays), (*Gamma-ray scattering, Monte Carlo method), (Photons, Distribution), Air, Sources.

Monte Carlo techniques were applied in a detailed study of the gamma radiation environment produced in air three feet above fallout uniformly distributed on a smooth ground surface. The basic computations included the energy and angular distributions of the scattered photon flux above monoenergetic plane isotropic gamma-ray sources for ten different source energies from 0.10 to 3.5 Mev. For each source of energy, the flux arriving at the receiver in each of ten energy intervals between 0.04 and 3.5 Mev and eighteen equal receiver angle intervals between 0 (nadir) and 180 degrees (zenith) was calculated. Separate calculations were performed for the uncollided fluxes from the infinite plane isotropic source. The results of the monoenergetic calculations were combined to obtain energy and angular distributions of the photon flux from fallout of four different ages: 1.12 hours, 23.8 hours, 4.57 days, and 9.82 days. Comparisons with measured and previously calculated data, both for actual fallout fields and for simulated infinite plane sources, show favorable agreement. (Author)

AD-612 031 Div. 20, 25, 30
CFSTI Prices: HC$4.00 MF$1.00

Radiation Research Associates, Inc., Fort Worth, Tex.
UTILIZATION INSTRUCTIONS FOR GENERAL

APPLICATION OF THE LO5 MONTE CARLO PROCEDURE,
by D. G. Collins. 29 May 64, 144p Rept. no. RRA-T44
Contract DA49 146XZ254

Unclassified report

See also AD-402 616.

Descriptors: (*Monte Carlo method, Nuclear reactions), (*Gamma-ray scattering, Monte Carlo method), (*Neutron scattering, Monte Carlo method), Penetration, Scattering, Transport properties, Programming (Computers), Geometry, Transformations (Mathematics), Neutrons, Gamma rays, Punched cards.

Instructions for the utilization of LO5, a Monte Carlo procedure for performing neutron and gamma ray penetration and scattering calculations on the IBM-7090, have been rewritten to clarify and add detail to the previous instructions. The revised utilization instructions apply to the original LO5 Code as well as to the RRA version of LO5 which has been modified to enhance its applicability to general shielding calculations. A description of the principal mathematical relations used by the code in the solution of neutron and gamma ray transport problems is included. Detailed definitions and formats for the input data which comprise problem deck and the energy and element library decks are given. In addition, peculiarities in the input data requirements discovered in extensive use of the code are discussed. General operational information for running the code on the IBM-7090 are also given. (Author)

AD-612 032 Div. 20
CFSTI Prices: HC$4.00 MF$0.75

Radiation Research Associates, Inc., Fort Worth, Tex.
A COMPARATIVE STUDY OF RADIOACTIVE SOURCE ARRANGEMENTS FOR SIMULATING FALLOUT GAMMA RADIATION FIELDS,
by R. L. French. 15 Jun 64, 107p Rept. no. RRA-T45
Contract DA49 146XZ254

Unclassified report

See also AD-612 029.

Descriptors: (*Radioactive fallout, Gamma rays), (*Gamma rays, Simulation), (*Monte Carlo method, Gamma rays), (*Gamma-ray scattering, Monte Carlo method), Scattering, Nuclear particles, Distribution, Cobalt, Cerium, Cesium, Isotopes, Sources, Air, Water.

Monte Carlo techniques were used in a study of three basically different approaches to simulating the gamma radiation environment near the air/ground interface due to fallout uniformly distributed on the ground surface. The energy and angular distribution of the photon flux at a receiver 3 feet above the ground due to a Co60 point isotropic source also three feet above the ground and at separation distances of 100 to 800 feet was computed, and the results bore little resemblance to those from a uniform fallout field. Results computed for a receiver position three feet above idealized Ce144, Cs137, and Co60 infinite plane sources on the ground indicated good simulation of the angular distribution of the gamma-ray dose and, except for energies greater than 1.25 Mev, reasonable simulation of the energy spectra from fallout. A third source arrangement, called the 'compact simulator', simulated the fallout gamma radiation environment equally well. In the compact simulator, an overhead slab of water acts as a reflector to simulate air scattering. (Author)

AD-612 038 Div. 20
CFSTI Prices: HC$1.00 MF$0.50

Stanford Univ., Calif.
NUCLEAR STRUCTURE.
Final progress rept. for 1 Apr-31 Dec 64.
26 Feb 65, 6p
Contract Nonr22575, Proj. NR024 011

Unclassified report

Descriptors: (*Nuclear energy levels, Nuclear reactions), (*Nuclear reactions, Nuclear energy levels), Nuclear shell models, Gamma emission, Alpha particle reactions, Deuteron capture, Proton capture, Neutron cross sections, Lithium, Beryllium, Nuclear structure.

Nuclear energy levels and nuclear reaction mechanisms were studied. Proton, deuteron, helium-3 and alpha particle reactions on Li6, Li7, and Be9 were studied. A gamma-ray detector was used which features cosmic-ray anticoincidence shielding and anti pile-up circuitry. Cluster effects are described. It was found that the levels in Be8 between 16 and 18 MeV can apparently be described by simple shell model wave functions. Lifetimes of the first excited states of the mirror nuclei Li7 and Be7 were determined by Doppler shift measurements using Li-drifted Germanium detectors.

AD-612 071 Div. 20
CFSTI Prices: HC$3.00 MF$0.75

General Dynamics/Fort Worth, Tex. Nuclear Aerospace Research Facility.
INDUCED-VOLTAGE STUDIES IN A COBALT-60 GAMMA IRRADIATOR.
Technical rept. for 1 Oct 63-30 Sep 64,
by L. W. Nelms. Feb 65, 56p Rept. no. FZK-214
Contract AF29 601 6213, Proj. 6773, Task 677302
WL TR-64-149

Unclassified report

Descriptors: (*Photoelectric effect (Gamma rays), Electricity), (*Electric currents, Photoelectric effect (Gamma rays)), (*Voltage, Photoelectric effect (Gamma rays)), Cobalt, Isotopes, Compton scattering, Capacitors, Cylindrical bodies, Electrons, Theory, Electrodes, Intensity, Electric fields, Electric insulation.

An investigation into the basic mechanism of gamma-radiation induced current and voltage in electrical systems has been started by using the NARF 1500-curie Co60 radiation source. Steady-state measurements of electric potentials induced in a specially constructed hollow cylindrical capacitor as a function of gamma field direction, gamma field strength, and apparatus temperature are described. It is concluded that the Compton process is the dominant mechanism involved. A theory is developed explaining in detail how electrons from Compton collision might produce currents in a simple insulator-conductor system. It was found that, within the narrow range of gamma field intensity available, the induced current depended linearly upon field intensity as the equation predicted. (Author)

AD-612 102 Div. 20, 14, 17
CFSTI Prices: HC$1.00 MF$0.50

Radiation Effects Information Center, Columbus, Ohio.
RADIATION EFFECTS INFORMATION CENTER MONTHLY ACCESSION LIST. ABSTRACT NO. 26264 TO 26323, PART I,
Rept. for 1-28 Feb 65.
10 Mar 65, 25p REIC-MAL-84
Contract AF33 615 1124

Unclassified report

Descriptors: (*Radiation damage, Materials), (*Materials, Radiation damage), (*Bibliographies,

Radiation damage), Abstracting, Metals, Ceramic materials, Radiation chemistry, Organic materials, Polymers, Electronic equipment, Space environmentals conditions.

AD-612 104 Div. 20, 14, 17
CFSTI Prices: HC$1.00 MF$0.50

Radiation Effects Information Center, Columbus, Ohio.
RADIATION EFFECTS INFORMATION CENTER MONTHLY ACCESSION LIST COORDINATE INDEX. PART II.
Rept. for 1 Oct 64-28 Feb 65.
10 Mar 65, 10p
Unclassified report

Descriptors: (*Radiation damage, Materials), (*Materials, Radiation damage), (*Indexes, Radiation damage), Subject indexing, Information retrieval, Radiation chemistry, Ceramic materials, Metals, Organic materials, Polymers, Electronic equipment, Space environmental conditions.

The inverted concept-coordinate index is based upon terms generated in the REIC subject files. The index is cumulative throughout the year, and the staff will provide a 'dual dictionary' at the end of each contract year to facilitate the retrospective search capabilities for the accession list abstracts. The index is subdivided into two sections. The first, Radiation Environment, includes dosimetry and energy aspects of all electromagnetic and particulate radiation sources, with the exception of space radiation. Section two deals with materials, properties, secondary environment (including space environments), devices, and all other subject concepts. Under each concept term in the index are listed the accession numbers of the abstracts which have been indexed by that term. Links have been added where necessary to obviate improper coordination with the resulting false retrieval.

AD-612 191 Div. 20, 8
CFSTI Prices: HC$1.00 MF$0.50

Air Force Weapons Lab., Kirtland AFB, N. Mex.
STUDY TO REDUCE AND COMPILE USAF NAP RADIATION EFFECTS DATA, SUPPLEMENT 1.
Supplemental rept. for 1 Jun-1 Dec 64,
by Daniel G. Emdee. Feb 65, 24p
Rept. no. WL-TDR-64-1, suppl. 1
Proj. 1831, Task 183108
Unclassified report

Descriptors: (*Electronic equipment, Radiation damage), (*Radiation damage, Electronic equipment), Gamma rays, Neutron flux, Cobalt, Radioactive isotopes, Nuclear reactors, Transistors, Diodes, Semiconductors, Capacitors, Data storage systems, Punched cards, Magnetic tape, Environmental tests, Test methods.

An interim report is presented on the continuing in-house effort to reduce and compile data generated during various irradiation tests of electronic piece parts. Irradiation tests were performed on approximately 800 electronic piece parts to determine the effects of reactor-produced radiation on their operational characteristics. The devices were subjected to integrated neutron fluxes greater than 10 to the 15th power n/cm squared (E>0.1 Mev) and gamma doses in excess of 10 to the 8th power rad (C). A few of the devices were tested exclusively in a Co60 gamma source to approximately 8 x 10 to the 7th power rad (C) at the University of Michigan. The data generated in the above tests have been reduced to approximately six pertinent data points and recorded on computer library file cards and magnetic tape, along with information such as piece part application, manufacturer, manufacturing process, etc., concerning each part. A limited retrieval and printout program has been written for in-house study of the collected data. (Author)

AD-612 192 Div. 20, 2
CFSTI Prices: HC$1.00 MF$0.50

Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
NUCLEAR PHYSICS AND COSMIC RAYS.
Annual progress rept. for period ending 1964.
11 Mar 65, 23p
Contract Nonr377700, Proj. NR024 021
Unclassified report

Descriptors: (*Nuclear physics, Scientific research), (*Cosmic rays, Atmosphere), Fluorescence, Nuclear resonance, Nuclear scattering, Inelastic scattering, Excitation, Nuclear energy levels, Nuclear isobars, Electromagnetic properties, Particle accelerators, Nuclear spins, Neutron, Propagation, Monitors, Absorption.

Contents: Nuclear physics: Resonance fluorescence studies--(1) lifetime of the 6.880-MeV level in Si(28), (2) properties of the 4.403-MeV and 4.504-MeV excited states of A1(27), (3) properties of the 7.15-MeV state in P(31), (4) polarization of the resonance radiation from the 2.21-MeV level in A1(27), (5) further studies with Na(23) and A1(27); Theoretical studies-- excitation of analog states by inelastic electron scattering; Cosmic rays: Airborne intensity survey--(1) isocosms, (2) the cosmic ray equatorial longitude effect, (3) the north and south plateau intensities; Atmospheric absorption of nucleonic component-- (1) attenuation length, L, (2) nucleon propagation through the atmosphere; Neutron multiplicity experiments.

AD-612 197 Div. 20
CFSTI Prices: HC$3.00 MF$0.50

RAND Corp., Santa Monica, Calif.
FIREBALL PHENOMENOLOGY,
by Harold L. Brode. Oct 64, 51p Rept. no. P-3026
Unclassified report

Prepared for presentation at the Tripartite Technical Cooperation Panel Meeting, Panel N3, held at the Joint Fire Service College, Dorking, England, 5-9 October 1964.

Descriptors: (*Nuclear explosions, Physical properties), Temperature, Density, Thermal radiation, Airburst, Explosion effects, Shock waves, Gamma rays, X-rays, Neutrons, Energy, High altitude, Nuclear weapons, Scale, Mathematical prediction.

The paper deals with some of the properties of nuclear explosions which influence the predictions and scalings for fireball phenomena, notably fireball sizes, temperatures, densities, and ultimately the thermal radiation output. Attention is focused on the initial features of fireball formation for which is examined the scaling with both yield and altitude of burst. For the present, these scalings are derived from a few theoretical calculations which describe fireball features for several yields and altitudes.

AD-612 208 Div. 20

Syracuse Univ., N. Y. Dept. of Physics.
PARITY, CHARGE CONJUGATION, AND TIME REVERSAL IN THE GRAVITATIONAL INTERACTION.
Revised ed.,

by J. Leitner and S. Okubo. 8 Jul 64, 7p
Rept. no. TR-4-64
Contract Nonr66912, Proj. NR022 296
Unclassified report

Pub. in Physical Review (U. S.) v136 n5B pB1542-6 Dec 7 1964 (Copies not available to DDC or Clearinghouse customers). Revision of rept. dated 2 Jun 64. Prepared in cooperation with Rochester Univ., N. Y.

Descriptors: (*Elementary particles, Theory), Parity, Charged particles, Time, Gravity, Photons, Hamiltonian, Perturbation theory.

Some consequences of possible violation of parity (P), charge conjugation (C), time reversal (T), and TCP invariance in the gravitation interaction are discussed and compared with existing experimental evidence. The evidence is suggestive of TCP (or CP or C) invariance, but one cannot rule out separate violation of P, C, and T (Author)

AD-612 210 Div. 20, 15

Western Reserve Univ., Cleveland, Ohio.
NUCLEAR MATRIX ELEMENTS FOR FIRST-FORBIDDEN BETA DECAY,
by L. S. Kisslinger and Chi-Shiang Wu. 27 Jul 64, 6p
Grant DA ORD31 124 61G81
AROD 2890:5
Unclassified report

Pub. in Physical Review (U. S.) v136 n5B pB1254-9 Dec 7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Beta decay, Selection rules), (*Nuclear models, Beta decay), (*Operators (Mathematics), Beta decay), Hamiltonian, Quantum mechanics, S-matrix, Phonons, Odd-odd nuclei, Even-enven nuclei, Nuclear shell models, Nuclear structure, Integrals.

The first-forbidden beta decay from the ground states of odd-odd nuclei to the quadrupole vibrational states of even-even nuclei is studied. It is found that the collective motions introduce particle-hole correlations and thereby lead to cancellations, which is the dominant feature of these processes. The region of proton number between 50 and 60 is treated in detail. (Author)

AD-612 313 Div. 20, 15

Institute for Advanced Study, Princeton, N. J.
INELASTIC COLLISIONS AND THRESHOLD EFFECTS,
by L. Fonda. 5 May 61, 31p
Grant AF AFOSR61 19
AFOSR 2783
Unclassified report

Pub. in Nuovo Cimento. Supplemento (Italy) n2 p116-45 1961 (Copies available only to DDC users).

Descriptors: (*Inelastic scattering, Green's function), (*Green's function, Inelastic scattering), Hamiltonian, S-matrix, Parity, Phase shifts, Differential cross section, Spin, Potential scattering, Elastic scattering, Electric fields, Neutrons, Protons, Pions, Strange particles.

The many-channel problem is discussed with emphasis on the anomalous energy dependence which is observed in the scattering and reaction cross-section at the threshold of a new inelastic process. A new method of approaching these phenomena is introduced and is based on an investigation of the properties of the complete Green's function which describes the multi-channel system.

AD-612 384 Div. 20
CFSTI Prices: HC$3.00 MF$0.75

Harry Diamond Labs., Washington, D. C.
NUCLEAR MAGNETIC RESONANCE IN BORON TRIOXIDE AT ELEVATED TEMPERATURES,
by James C. McDade. 15 Jan 65, 57p
Rept. no. TR-1259
Projs. DA1A010501B010, 16600
Unclassified report

Descriptors: (*Nuclear magnetic resonance, Glass), (*Boron compounds, Oxides), (*Glass, Nuclear magnetic resonance), High-temperature research, Transition temperature, Nuclear electric moments, Nuclear spins, Relaxation time, Radiofrequency spectroscopy, Molecular structure, Correlation techniques, Perturbation theory, Nuclear energy levels, Chemical bonds, Molecular properties.

The magnetic resonance of the B11 nucleus in vitreous boron trioxide was observed at 10 Mcps and at temperatures ranging from room temperature to 800C. The resonance line narrows with increasing temperature to about 600C, above which it broadens again. The narrowing below the glass-transition temperature T sub g is attributed to lattice vibrations; that above T sub g, to molecular rotation. The broadening above 600C is ascribed to the decrease in the life time of the energy states. Theory is given relating the line width to the molecular motion of the liquid. There is no evidence for a proposed change in molecular structure. (Author)

AD-612 409 Div. 20
CFSTI Prices: HC$1.00 MF$0.50

Nuclear Power Field Office, Fort Belvoir, Va.
CLOSED CYCLE GAS TURBINE,
by W. M. Crim, Jr. 1963, 16p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y. 17-19 June 1964, Volume 1, AD-611 432.

Descriptors: (*Nuclear power plants, Gas turbines), (*Gas turbines, Nuclear power plants), Electric power production, Design, Performance (Engineering), Reactor shutdown, Reactor start-up sources, Lubrication, Thermodynamics, Thermodynamic cycles, Heat exchangers, Gas turbine regenerators, Turbine parts, Compressors, Pipes, Portable.

The closed cycle gas turbine power plant has been under development by the firm of Escher-Wyss, Ltd. of Zurich, Switzerland since 1940. During this time some dozen or more central station type plants have been put into operation, in the 12000 KW class. This paper is presented based on the concept, theories explored, design, fabrication, construction, and initial testing in the first experimental compact closed cycle (AK process) thermodynamic system.

AD-612 410 Div. 20, 25
CFSTI Prices: HC$1.00 MF$0.50

White Sands Missile Range, N. Mex. Nuclear Effects Lab.

RETROFUGAL ELECTRON FLUX FROM MASSIVE TARGETS IRRADIATED WITH A MONOENERGETIC PRIMARY BEAM,
by Ralph W. Dressel. 1963, 15p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y. 17-19 June 1964, Volume 1, AD-611 432.

Descriptors: (*Electron beams, Scattering), (*Secondary emission, Quantum statistics), Electrons, Energy, Particle accelerator targets, Transport properties, Numerical analysis, Errors.

The term 'retrofugal flux' is introduced to include the backscattering plus the backward secondary emission occuring when a beam of monoenergetic electrons strikes a thick target. A comparison of computations of the angular distribution and the energy spectrum of this flux is made with experimental determinations in order to evaluate the validity of the approximations used in the calculations.

AD-612 432 Div. 20, 15

California Inst. of Tech., Pasadena.
NUCLEAR MATRIX ELEMENTS FOR THE MIRROR DECAYS OF B12 AND N12,
by J. Eichler, T. A. Tombrello, and J. N. Bahcall.
20 Sep 64, 3p
Contract Nonr22047; Grant NASA NGR05 002 028
Unclassified report

Pub. in Physics Letters (Netherlands) v13 n2 p146-8 Nov 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Beta decay, Nuclear binding energy), (*Nuclear binding energy, Nuclear isobars), (*Nuclear isobars, Beta decay), Nitrogen, Boron, Selection rules, Nuclear energy levels, Carbon.

AD-612 434 Div. 20, 2

California Inst. of Tech., Pasadena.
NEUTRINO OPACITY. II. NEUTRINO-NUCLEON INTERACTIONS,
by John N. Bahcall and Steven C. Frautschi.
20 Jul 64, 7p
Contract Nonr22047, Grant NASA NGR05 002 028
Unclassified report

Pub. in Physical Review (U. S.) v136 n5B pB1547-52 Dec 7 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Neutrinos, Nucleons), (*Resonance scattering, Neutrinos), (*Absorption, Neutrinos), (*Supernovae, Neutrinos), Antiparticles, Cosmic rays, Muons, Electrons.

The contribution of neutrino-nucleon interactions to the neutrino opacity of matter is studied, specal attention being paid to possible astrophysical applications such as supernova explosions. The results of recent accelerator experiments with high-energy neutrinos are used to show that nonresonant neutrino-nucleon scattering does not make a significant contribution to the neutrino opacity for astrophysically important conditions. The results of deep-mine cosmic-ray studies are then used to show that, (a) there are no resonances in the neutrino-nucleon and antineutrino-nucleon systems with masses less than 60 BeV when muons are produced (laboratory neutrino energies <2,000 BeV), and (b) there are no resonances in the neutrino-neucleon and antineutrino-nucleon systems with masses less than 7 BeV when electrons are produced (laboratory neutrino energies <30 BeV). Neutrino absorption by bound nucleons is also discussed and a sum rule is proved for neutrino capture that is sufficiently accurate for most astrophysical applications. The effect of the exclusion principle on the capture cross sections is described and some applications to specific nuclei are presented. The accelerator experiments with high-energy neutrinos are then used to show that neutrino radioactivity, i.e., nuclear de-excitation by emission of neutrino-antineutrino pair, is a substantially less important mechanism for stellar energy loss than was suggested by some previous estimates. (Author)

AD-612 438 Div. 20

Institut de Recherches nucleaires, Strasbourg (France).
DOUBLE GAMMA EMISSION IN THE 6.06-Mev MONOPOLE TRANSITION OF O16,
by S. Gorodetzky, G. Sutter, R. Armbruster, P. Chevallier, and P. Mennrath. 27 Jul 61, 4p
Contract AF61 052 598
AFOSR 2932
Unclassified report

Pub. in Physical Review Letters (U. S.) v7 n5 p170-2 Sep 1 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gamma emission, Nuclear energy levels), (*Nuclear energy levels, Gamma emission), (*Pair production, Gamma emission), Nuclear resonance, Oxygen, Coincidence counting, Nuclear reactions.

21. Nuclear Propulsion

AD-611 838 Div. 21, 12, 27
CFSTI Prices: HC$4.00 MF$1.00

Douglas Aircraft Co., Inc., Santa Monica, Calif.
CONCEPTUAL DESIGN ANALYSIS OF A 5 MWE THERMIONIC REACTOR SPACE PROPULSION PLANT,
by F. A. Ross and T. F. Plunkett. Feb 65, 149p
Rept. no. SM-46275

Unclassified report

Descriptors: (*Spacecraft nuclear propulsion, Thermionic emission), Manned spacecraft, Space probes, Power reactors, Ion engines, Weight, Reactor materials, Design, Mars probes, Simulation.

The conceptual design of a 5 MWE thermionic reactor propulsion plant is presented. Thermionic emission characteristics are evaluated for a cylindrical power converter incorporating a 60 v/o uranium dioxide-tungsten cermet fuel, a tungsten emitter and alternative collector materials. Optimization of the reactor and the associated primary coolant and heat rejection systems results in an average emission temperature of 2195 to 2285K, and an average radiator coolant temperature of 1595F under rated operating conditions. The specific weight of the overall propulsion plant incorporating electron bombardment ion engines is 19.4 lb/KWE, including radiator structure and a reactor shielding weight of 2.8 lb/KWE. The propulsion plant is integrated with the payload requirements for a manned Mars mission in a space vehicle configuration which is nominally within the Earth orbit capabilities of an augmented Saturn C-5 launch vehicle, assuming the propellant and crew are orbited by separate vehicles. A mission analysis is conducted to determine the comparative performance of the plant as a function of thrustor limitations, specific weight and power level. The effects of using a separate nuclear rocket stage for Earth escape are also evaluated.

AD-612 368 Div. 21, 1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ATOMIC ENERGY AND AVIATION,
by A. P. Ermakov and A. G. Syramai. 12 Feb 65, 19p FTD-MT-64-415
TT 65-61810

Unclassified report

Edited machine trans. of mono. Atomnaya Energiya i Transport (Atomic Energy and Transport) Moscow, 1963, chap. 7, p. 101-114.

Descriptors: (*Aircraft nuclear propulsion, Reviews), (*Aeronautics, Nuclear energy), Fuel consumption, Aircraft, Turbojet engines, Shielding, Air transportation, Flight, USSR.

A general discussion of aviation technology is presented as a preface to a more specific discussion on aircraft nuclear propulsion. Sub topics include aircraft reactors, aircraft nuclear power plants, nuclear open cycle TRD, ramjet atomic engine, and closed cycle system.

22. Ordnance

AD-611 648 Div. 22, 9

Suffield Experimental Station, Ralston (Alberta).
THE AIR VELOCITY IN BLAST WAVES FROM T.N.T. EXPLOSIONS,
by J. M. Dewey. 29 Oct 63, 23p
Unclassified report

Pub. in Royal Society of London. Proceedings. Series A. Mathematical and Physical Sciences (Gt. Brit.) v279 p366-85 1964 (Copies available only to DDC users).

Descriptors: (*TNT, Explosion effects), (*Shock waves, Explosions), (*Explosions, Aerodynamic characteristics), Detonations, Gas flow, Air, Velocity, Smokes, Measurement, Iterative methods, Particles, Canada.

The air velocity was measured in blast waves produced by the detonation of trinitrotoluene (t.n.t.) charges varying in mass from 30 to 200,000 lb. The technique consists essentially of using a high-speed camera to record the displacement of smoke trails formed close to the charge just before detonation. The initial decay of velocity behind the shock agrees well with theoretical predictions, such as those of Brode (1959), but at later times there is an extended outward flow, which, it is postulated, is caused by the 'after-burning' of the detonation products in the presence of atmospheric oxygen. It was shown that this phenomenon does not occur in the case of detonation of an explosive with a high oxygen balance, or for a nuclear detonation. It was demonstrated that particle trajectories, determined by the smoke tracer technique, may be used to calculate the variations of density, pressure and temperature within the wave, without reference to other measurements. (Author)

AD-612 041 Div. 22
CFSTI Prices: HC$1.00 MF$0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
LETHAL AREA DESCRIPTION,
by K. A. Myers. Jul 63, 24p
Technical note no. 1510
Proj. 1M023201A098
Unclassified report

Descriptors: (*Terminal ballistics, Mathematical analysis), (*Kill probabilities, Terminal ballistics), Fragmentation, Weapon systems, Targets.

A detailed description of the lethal area problem is given, including a discussion of the procedure presently used at BRL in the computations of lethal areas. (Author)

AD-612 122 Div. 22, 17
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
EFFECTS OF ALLOY SEGREGATION ON SPALLING OF METALLIC ARMOR MATERIALS,
by K. H. Abbott. 1964, 12p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y. 17-19 Jun 1964, Volume 1, AD-611 432.

Descriptors: (*Armor plate, Fracture (Mechanics)), (*Fracture (Mechanics), Armor plate), Steel, Titanium alloys, Castings, Mechanical working, Microstructure, Aluminum alloys, Vanadium alloys, Tin alloys, Porosity, Hardness, Penetration, Heat treatment.

Several illustrations of the spall crack propagation in cast and wrought metallic armor alloys have been presented. Dendritic or banded structures resulting from alloy segregation during solidification of the metals have been shown to be related to spall crack propagation. Neither working nor short-time homogenization treatments significantly effect the alloy segregation. Hence, minimization of the banding (alloy segregation) appears to be dependent on a better understanding of, as well as control of, the solidification process. (Author)

AD-612 144 Div. 22
CFSTI Prices: HC$1.00 MF$0.50

Army Tank-Automotive Center, Warren, Mich.
FRICTION HYDRO PNEUMATIC SUSPENSION SYSTEM,
by William J. Hart, Jr., Robert J. Otto, and Alex H. Sinclair. 1957, 16p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference United States Military Academy, West Point, N. Y. 17-19 Jun 1964, Volume I, AD-611 432.

Descriptors: (*Tanks (Combat vehicles), Suspension devices), (*Suspension devices, Pneumatic devices), Hydraulic systems, Military requirements, Vibration isolators, Design, Pneumatic brakes, Springs, Torque, Performance (Engineering), Friction, Pitch (Motion), Motion, Damping, Velocity, Power, Feasibility studies, Terrain.

It was found possible to design a suspension system which provides a 41-ton tank with approximately 100% increase in cross-country speed without increasing the power-to-weight ratio of the vehicle. A suspension system incorporating a low spring rate and adequate damping provides a significant reduction in pitch and bounce vibrations, thereby increasing vehicle cross-country speed capability without degrading the effectiveness of the crew or the vehicle weapons system. It was found feasible to design cross-country vehicles with a speed capability of 30-35 miles per hour within the present state of the art. A major advancement in mobility machinery was achieved by means of a theoretical analysis of suspension design characteristics and performance parameters. (Author)

AD-612 153 Div. 22, 6, 12, 30
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
DIGITAL RANGE UNIT THEORY OF OPERATION AND CIRCUIT DESCRIPTION,
by Kenneth O. Bryant and Sara G. Valdivia.
Jan 65, 40p Rept. no. NOTS-TP-3730
Task RMWC21 088 216 1F009 04 02
Unclassified report

Descriptors: (*Radar range computers, Circuits), (*Digital computers, Radar range computers), Radar tracking, Operation, Theory, Frequency multipliers, Display systems, Computer logic, Fire control computers.

The report describes the experimental digital range unit used with the M-33D radar. The unit, designed and built for use with both the M-33D and Nike-Ajax radar sets, is part of the testing facility constructed at NOTS for the Surface Launched Weapon Control exploratory

development project. (Author)

AD-612 172 Div. 22
CFSTI Prices: HC$2.00 MF$0.50

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
MEASUREMENT OF THE INTERFERENCE THAT VARIOUS TRACK PROFILES WOULD PRODUCE ON A BLAST WAVE,
by S. Dean Lewis and J. Ray Ruetenik. Dec 64, 42p
Rept. no. ASRL-TR-131-1
Contract AF04 694 427

Unclassified report

Descriptors: (*Rocket propelled sleds, Airburst), (*Airburst, Rocket propelled sleds), (*Test equipment, Rocket propelled sleds), Blast, Railroad tracks, Model test, Shock tubes, Shock waves, Interferometer, Simulation, Interference, Design.

Measurements are made of the interference produced on a step blast wave passing across a model of the Holloman Air Force Base sled track. The effect of building up the berm and filling in the trough of the track is examined using 7 modifications of the present track contour. (Author)

AD-612 447 Div. 22, 30

Naval Ordnance Lab., White Oak, Md.
THE NOL HYDROBALLISTICS FACILITY,
by V. C. D. Dawson. 1965, 7p

Unclassified report

Pub. as AIAA Paper no. 65-239.
Presented to the AIAA/USN Marine Systems and ASW Conference, San Diego, Calif., 8-10 Mar 65.

Descriptors: (*Naval research laboratories, Ordnance laboratories), (*Ordnance laboratories, Terminal ballistics), (*Terminal ballistics, Underwater ordnance), (*Underwater ordnance, Terminal ballistics), Test facilities, Water tanks, Instrumentation.

The recognized lack of data on high speed water entry has led to the construction of a new facility primarily devoted to research in this field. A large tank structure is being built at the Naval Ordnance Laboratory which will be used for the study of water entry phenomena pertaining to naval weapons development at velocities up to 3,000 feet per second. This report provides a description of the tank, its operation and the instrumentation that will be utilized to fulfill the required mission. (Author)

23. Personnel and Training

AD-611 865 Div. 23, 30
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
SYSTEMS ANALYSIS IN EDUCATION.
Professional paper,
by John E. Coulson and John F. Cogswell. 13 Jan 65, 19p Rept. no. SP-1863

Unclassified report

Presented at the Conference on the Development and Use of Data Banks for Educational Research, Boston, Mass., 4 Dec 64.

Descriptors: (*Education, Operations research), Analysis, Management engineering, Decision making, Achievement tests, Instructors, Students, Statistical analysis.

The paper is concerned with systems analysis in education, which certainly includes some highly complex man-machine systems. To make these words more than a catch phrase, the systems analysis process is described in fairly concrete terms, giving specific examples of the procedures and products of such analyses. At the conclusion of the paper, some possible implications of systems analysis procedures for educational data banks are discussed.

AD-611 875 Div. 23
CFSTI Prices: HC$1.00 MF$0.50

HRB-Singer, Inc., State College, Pa.
A WORD PICTURE CHECKLIST FOR OFFICER EFFECTIVENESS REPORTS,
by James M. McKendry and Carl Lindsay.
Nov 64, 23p
Contract AF41 609 2020, Proj. 7719, Task 771904
PRL TR-64-30

Unclassified report

Descriptors: (*Officer personnel, Effectiveness), (*Personnel management, Officer personnel), Feasibility, Selection, Performance tests, Reports.

A feasibility study was conducted to convert the Word Picture section of the current Officer Effectiveness Report (OER) into a checklist of descriptive items. A set of OERs was reviewed to select content areas. A checklist of 100 items was assembled and tried out with over 1000 raters who rated subordinate officers by both an OER and the experimental checklist. From raters' evaluations and item analysis, 56 items were selected for cross validation with another 1000 raters. A high proportion of the selected items correlated positively with the OER ratings and about 60 percent of the raters favored adoption of the checklist concept. Reliability of the procedure and influence of a checklist in the official rating process were not considered in this study. (Author)

AD-611 989 Div. 23, 28

Manitoba Univ., Winnipeg.
PERSONALITY FACTORS IN THE SELECTION OF CIVILIANS FOR ISOLATED NORTHERN STATIONS,
by Morgan W. Wright, George C. Sisler, and Joanne Chylinski. 29 Jan 62, 6p
Grant DRB9425 07

Unclassified report

Pub. in Journal of Applied Psychology (U.S.) v47 n1 p24-9 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Civilian personnel, Selection), (*Personality, Psychometrics), (*Adjustment (Psychology), Arctic regions), Aptitude tests, Applied psychology, Electronic technicians, Canada, Corrections, Correlation techniques.

An investigation of personality characteristics associated with favorable adjustment to northern isolated living, and the usefulness of psychological tests in the selection of personnel for northern posting. 197 electronic technicians already screened on other psychological tests completed MMPI. Edwards Personal and Brainard Preference tests, and General Information and Arctic Interest questionnaires prior to 1 year of isolation duty on the Mid-Canada Line. Adequacy of work and social adjustment was associated with 11 of 35 test variables and 3 of 26 questionnaire items. The discriminating function of the MMPI was reduced by the use of the K correction. It was suggested that despite the highly select nature of the sample used, the test battery has potential value in the selection of civilians to work in the far north. (Author)

AD-612 278 Div. 23, 20
CFSTI Prices: HC$4.00 MF$1.00

Weston Instruments, Inc., Newark, N. J.
COMPUTER ACTIVATED ELECTROLUMINESCENT DISPLAY SCREEN. APPLICATION OF LIGHT AND IMAGE INTENSIFICATION TECHNIQUES, PHASE I.
Final rept. for May 59-Oct 64,
by Martin Kaplan, William Laeng, Wolf Merel, and Irwin Munt. Oct 64, 123p
Contract N61339 656
NAVTRADEVCEN 656-1

Unclassified report

Descriptors: (*Viewing screens, Display systems), (*Display systems, Training devices), (*Electroluminescence, Viewing screens), (*Training devices, Viewing screens), (*Vehicles, Simulation), Light, Images, Digital computers, Computer storage devices, Equations, Flight, Punched tape, Magnetic tape, Real time, Feasibility, Mathematics, Photoconductivity.

The report studies techniques necessary for a computer-activated, wide-angle display system capable of generating scenes. Ultimately, a universally useful training module would result enabling the adaption of the system to vehicle simulation. The objects to be displayed exist in computer storage. Perspective equations are utilized by a computer to provide a two-dimensional display in true perspective of static and dynamic figures on a non-programmed wide-angle display. The display is updated in a way determined by the position and orientation of a trainee during a simulated flight. The display screen is of the electroluminescent cross-grid type. A breadboard model was constructed to demonstrate the feasibility of the overall system recommended by the study phase, and to provide a research tool for additional system study. The breadboard model has been used to generate dynamic displays of two solid objects with changing perspective. A digital computer was ued as a tool to solve the perspective equations and represent the objects via the breadboard as they appear from a continuously moving point in space.

AD-612 426 Div. 23
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.

SOME ANALYTICAL TECHNIQUES FOR PERSONNEL PLANNING,
by W. Gorham. 14 Mar 60, 18p Rept. no. P-1942
Unclassified report

Descriptors: (*Personnel management, Air Force personnel), (*Air force personnel, Effectiveness), (*Management planning, Air force research), Job analysis, Costs, Wages, Scale, Time, Optimization, Manpower studies, Distribution, Decision making, Officer personnel, Operations research.

Analytical methods are presented for determining the relative contribution of Air Force personnel of different experience composition.

24. Photography and Other Reproduction Processes

AD-612 154 Div. 24, 1, 30
CFSTI Prices: HC$5.00 MF$1.25

University of Southern California, Los Angeles.

A SURVEY OF DOCUMENTARY AND TECHNICAL CINE PHOTOGRAPHY AT THE AIR FORCE FLIGHT TEST CENTER.
Master's thesis,
by Charles David Pellow. Jan 65, 184p
Unclassified report

Descriptors: (*Motion picture photography, Air force research), (*Air force research, Motion picture photography), (*Photographic recording systems, Motion picture photography), Aerospace craft, Flight testing, Performance (Engineering), Photographic analysis, Photographic equipment, Costs, Effectiveness, Military personnel, Civilian personnel, Test facilities, Ground support equipment, Reviews.

The purpose of this thesis was: (1) to present the problems encountered in obtaining cine photography in the testing of aerospace vehicles and related equipment at the AFFTC, and the attempts made to resolve these problems by military and civilian photographic experts; (2) to survey techniques used by cine photographers in obtaining documentary, engineering surveillance, and technical (scientific) cine photography at the AFFTC; (3) to survey equipment used by cine photographers at the AFFTC; and (4) to determine the effectiveness of cine photography in saving time, money, and lives in the flight test program.

25. Physics

AD-611 468 Div. 25, 4, 17

Westinghouse Research Labs., Pittsburgh, Pa.
REDISTRIBUTION OF SOLUTE DURING PHASE TRANSFORMATIONS,
by W. A. Tiller and R. F. Sekerka. 12 Mar 64, 4p
Contract AF49 638 1029
AFOSR 65-0163

Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n9 p2726-29 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Phase studies, Transformations), (*Solutions, Phase studies), (*Freezing, Phase studies), Solids, Liquids, Distribution, Diffusion, Electric fields, Ions, Alloys, Integral transforms, Equations of state.

The redistribution of solute during phase transformations where solute partitioning occurs at the two-phase interface is mathematically treated for (i) the special case of equal diffusion rate in both the liquid and solid and (ii) diffusion only in the liquid under the additional force of a constant electric field. This one-dimensional analysis shows that (i) diffusion in the solid has a small effect on the grown-in solute distribution for k sub 0 < 1 but an appreciable effect for k sub 0 < 1 and (ii) the presence of an electric field can significantly alter the grown-in solute distribution. Further, one can deduce from the latter analysis a new experimental method for determining the effective ionic mobility of the solute species in the liquid phase. (Author)

AD-611 481 Div. 25

Illinois Univ., Urbana.
COMMENTS ON THE PAPER 'ON THE THEORY OF LOCAL ELECTRONIC CENTERS IN ALKALI HALIDES' BY PEKAR AND PERLIN.
Short note,
by W. Beall Fowler and D. L. Dexter. 27 May 64, 4p
Grant AF AFOSR611 64
AFOSR 65-0190

Unclassified report

Pub. in Physica Status Solidi (Germany) v7 pK71-3 1964 (Copies available only to DDC users).

Descriptors: (*Color centers, Theory), (*Alkali metal compounds, Crystal lattice defects), Halides, Field theory, Continuum mechanics, Atomic energy levels.

AD-611 483 Div. 25, 15

Institute for Advanced Study, Princeton, N. J.
CONNECTION BETWEEN THE ASYMPTOTIC BEHAVIOR AND THE SIGN OF THE DISCONTINUITY IN ONE-DIMENSIONAL DISPERSION RELATIONS,
by Y. S. Jin and A. Martin. 11 May 64, 6p
Grant AF AFOSR42 64
AFOSR 65-0150

Unclassified report

Pub. in The Physical Review v135 n6B pB1369-74 Sep 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear scattering, Particles), (*Quantum mechanics, Scattering), Perturbation theory, Special functions (Mathematical), Complex variables, Integrals.

Starting from one-dimensional dispersion relations (either fixed-transfer or partial-wave), information on the sign of absorptive part which follows from unitarity, and in some cases analyticity in the Mandelstam ellipse in the t plane and polynomial boundedness, we derive various consequences of physical interest, e.g., a high-energy lower bound on the forward scattering amplitude, the minimum fluctuation of the sign of the discontinuity across the left-hand cut in the partial-wave dispersion relations, etc. In the derivations, the positiveness of the absorptive part plays an essential role by allowing us to construct a Herglotz function which has a well-known asymptotic behavior. (Author)

AD-611 486 Div. 25

Institute for Advanced Study, Princeton, N. J.
METHOD OF THE SELF-CONSISTENT FIELD IN GENERAL RELATIVITY AND ITS APPLICATION TO THE GRAVITATIONAL GEON,
by James B. Hartle and Dieter R. Brill.
25 Feb 64, 8p
Grant AF AFOSR42 64
AFOSR 65-0145

Unclassified report

Pub. in The Physical Review. v135 n1B pB271-8 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gravity, Relativity theory), (*Relativity theory, Gravity), (*Field theory, Gravity), Photons, Neutrinos, Geodesics, Differential equations, Tensor analysis.

Concentrations of radiation held together for a long time by their own gravitational attraction ('geons') have been studied for nearly a decade. The previous analyses are extended to the case where gravitational waves are the source of the geon's mass energy. To analyze these solutions of the free-space Einstein equations with persistent features, we develop an approximation method to treat small ripples on a strongly curved background metric. The background metric describes the large-scale persistent features of the geon and is taken to be spherically symmetric. The waves superimposed on this background have an amplitude small enough so that their dynamics can be analyzed in the linear approximation; however, their wavelength is so short, and their time dependence so rapid that their energy is appreciable and produces the strongly curved background metric in which they move. The Einstein equations are investigated in this limit of short wavelength. It is found that the large-scale features of thin-shell spherical gravitational geons-in fact, of thin-shell spherical geons constructed from any field of zero rest mass-are identical to those of the spherical electromagnetic geons analyzed previously. (Author)

AD-611 487 Div. 25, 20

Institute for Advanced Study, Princeton, N. J.
3-PION DECAY OF THE INTERMEDIATE VECTOR BOSON,
by Mirza A. B. Beg, John M. Cornwall, and Ching-Hung Woo. 10 Feb 64, 3p
Grant AF AFOSR42 64
AFOSR 65-0146

Unclassified report

Pub. in Physical Review Letters v12 n11 p305-7 Mar 16 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bosons, Nuclear reactions), (*Pions, Nuclear reactions), Meson reactions, Quantum statistics, Vector analysis.

An estimate is derived for the branching ratio R = Gamma (W to 3pi)/Gamma(e + nu) using a derivation of the Goldberger-Treiman formula. Consideration is given to both the scalar di-pion state (T = 0, 0(++)) and the vector di-pion state. The W(rho)(pi)coupling constant is found and the (W to 3pi) decay rates are tabulated.

AD-611 488 Div. 25, 20

Institute for Advanced Study, Princeton, N. J.
SCALAR DI-PION RESONANCE AND THE NUCLEON AXIAL FORM FACTOR,
by Ching-Hung Woo. 10 Feb 64, 3p
Grant AF AFOSR42 64
AFOSR 65-0148

Unclassified report

Pub. in Physical Review Letters v12 n11 p308-310 Mar 16 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pions, Resonance), (*Nucleons, Field theory), Meson reactions, Vector analysis, Quantum statistics, Bosons, Functions.

It is shown that the inclusion of a scalar di-pion resonance at m = 400 MeV and Gamma = 50 MeV can improve the agreement between theoretical and experimental information on the nucleon axial form factor.

AD-611 489 Div. 25, 20

Institute for Advanced Study, Princeton, N. J.
LARGE SYMMETRY BREAKING AND MASS RELATIONS,
by Ching-Hung Woo. 6 May 64, 4p
Grant AF AFOSR42 64
AFOSR 65-0147

Unclassified report

Pub. in The Physical Review v135 n6B pB1352-5 Sep 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Fermicons, Quantum mechanics), (*Bosons, Quantum mechanics), (*Quantum mechanics, Elementary particles), Quantum statistics, Line spectrum, Nuclear binding energy, Nuclear spins, Antiparticles, Hyperons, Nucleons.

The effects of symmetry breaking on the multiplet structure of composite particles are studied. The Sakata triplet is used for illustrations, and simple special models are studied where some mass regularities remain even in the presence of a fairly large symmetry breaking. (Author)

AD-611 492 Div. 25

California Univ., Los Angeles.
RUNAWAY MODES IN MODEL FIELD THEORIES,
by Sidney Coleman and Richard E. Norton. 27 Sep 61, 7p
Contract AF49 638 717
AFOSR 2003

Unclassified report

Pub. in Physical Review (U. S.) v125 n4 p1422-8 Feb 15 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Field theory, Linear systems), (*Differential equations, Field theory), Hamiltonian, Matrix algebra, Nucleons, Mesons, Time, Quantum mechanics.

Within the framework of linear quantum field theories, a general study is presented of the existence and removal of runaway modes-solutions of the equations of motion which exhibit a real exponential time dependence. It is hoped that this work will yield insight into the corresponding problem in physically realistic theories. It is shown that runaway modes occur only when the Hamiltonian is not positive definite, and that they occur in linear quantum theories whenever they appear in the corresponding classical theories. Three methods are proposed for eliminating these unphysical modes. One is the analog of the method used by Dirac in classical electron theory; the other two are believed to be new. (Author)

AD-611 494 Div. 25

Institut d'Optique, Paris (France).
OPTICAL PROPERTIES OF INHOMOGENEOUS FILMS,
by F. Abeles. 1963, 18p
Grant AF EOAR63 48
AFOSR 65-0157

Unclassified report

Pub. in mono. Ellipsometry in the Measurement of Surfaces and Thin Films, Symposium Proceedings, Washington, D. C., Sep 5-6, 1963, p41-58 Sep 15 1964. (Copies not available to DDC or Clearinghouse customers). Entire mono is available to public from Superintendent of Documents, GPO, Washington, D. C. 20402, as GPO-64-21782, C.13.10:256, NBS-MP-256, $2.25.

Descriptors: (*Optical properties, Films), (*Films, Optical properties), Refractive index, Differential equations, Bessel functions, Matrix algebra, Boundary value problems, Polarization, Vibration, Thickness, France.

The inhomogeneous films investigated have a refractive index n which is a function of the single coordinate z, the axis Oz having the direction of the normal to the planes which limit the layer. The discussion is limited to non-absorbing films, although mention is made of the possibilities of using the same methods for absorbing layers. Three different methods of computation are described: (a) use of the differential wave equation; (b) WKB approximation; (c) replacement of an inhomogeneous layer by a pile of homogeneous films. A numerical example is discussed, which corresponds to a refractive index of the inhomogeneous layer given by N = N sub i exp (alpha z). Exact solutions are given in terms of Bessel functions and they are compared with approximate solutions. Drude's equations, valid for very thin films, are not discussed in this article. (Author)

AD-611 495 Div. 25

Case Inst. of Tech., Cleveland, Ohio.
MAGNETIC BREAKDOWN EFFECTS IN THE GALVANOMAGNETIC PROPERTIES OF ZINC,
by R. W. Stark. 6 Apr 64, 16p
Grant AF AFOSR536 64
AFOSR 65-0185

Unclassified report

Pub. in Physical Review (U. S.) v135 v6A pA1698-A1713 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Zinc, Electromagnetic properties), (*Single crystals, Zinc), Magnetic properties, Crystal substructure, Electron transitions, Quantum mechanics, Transport properties, Atomic orbitals, Atomic energy levels, Nuclear spins, Perturbation theory, Brillouin zones, Line spectrum.

The galvanomagnetic properties of several single-crystal specimens of high-purity zinc were investigated. The results of this investigation are presented and a Fermi-surface topology consistent with the data is discussed. Many of the detailed features of the galvanomagnetic properties are found to result from the effects of magnetic breakdown. The open orbit parallel to the hexagonal axis is modified but not eliminated by magnetic breakdown at fields of about 17.5 kG. A 'giant orbit' of the type previously observed in magnesium is found in zinc. This orbit results from magnetic breakdown across the energy gap near K which separates the second-band hole sheet from portions of the third band electron sheets. The transition region of the magnetic breakdown which gives rise to the giant orbit is investigated in detail, and the large quantum oscillations which have been previously observed in the transport properties of zinc are shown to be a transition-region phenomenon. The oscillations appear to result from an oscillatory breakdown probability which, in turn, arises from oscillations in the density of states associated with the Landau levels of the needle-shaped portion of the Fermi surface of zinc. An analysis of the detailed shape of the oscillations indicated that the Landau levels of the needle are split into discrete spin levels with a very large effective g factor.

AD-611 497 Div. 25

Pennsylvania State Univ., University Park.
FERMI STATISTICS OF TWO-DIMENSIONAL FREE-ELECTRON SYSTEMS,
by J. P. McKelvey and E. F. Pulver. 28 Feb 64, 14p
Grant AF AFOSR73 63
AFOSR 65-0174

Unclassified report

Pub. in American Journal of Physics (U. S.) v32 n10 p749-61 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Semiconductors, Statistical analysis), (*Gases, Statistical analysis), (*Electrons, Statistical analysis), Nuclear particles, Distribution, Equations, Conductivity, Crystal lattice defects.

The variation of the Fermi energy with temperature and free-particle concentration is calculated analytically for a number of two-dimensional systems, including the free-particle gas, the intrinsic semiconductor and the impurity semiconductor. These illustrations, while, of course, applicable to certain physically realizable systems, are also of considerable illustrative and pedagogical interest, since the integrals which are involved can invariably be worked out in closed form. The Fermi energy as a function of temperature and concentration may then in some cases be calculated in closed form, while in others it is obtained implicitly as the solution to a fairly simple transcendental equation. The physical significance of the variation of Fermi energy as a function of temperature and concentration is discussed, and the deviation of the product of the concentration of free electrons and holes for the two-dimensional semiconductor from the Boltzmann mass-action result is calculated and discussed in detail. The conditions corresponding to the failure of the Boltzmann approximation and the onset of degeneracy are outlined. Application of the calculational methods to simple Bose-Einstein systems is briefly treated.

AD-611 498 Div. 25

University of Southern California, Los Angeles.
USE OF ELECTRON PROBES IN THE STUDY OF RECOMBINATION RADIATION,
by David B. Wittry and David F. Kyser. 14 Jan 64, 4p
Grant AF AFOSR76 63
AFOSR 65-0175

Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n8 p2439-42 Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Semiconductors, Physics), (*Electron bombardment, Semiconductors), Gallium alloys, Arsenic alloys, Surface properties, Deformation, Electron beams.

The electron probe microanalyzer was used to study the local variations in recombination radiation from gallium arsenide. The intensity of recombination radiation from different specimens varies by several order of magnitude. Local fluctuations are observed which are attributed to surface deformation and to non-uniform distribution of impurities. Within experimental error, the wavelength distribution was indistinguishable from the wavelength distribution from GaAs diodes. (Author)

AD-611 499 Div. 25

University of Southern California, Los Angeles.
METHODS OF QUANTITATIVE ELECTRON PROBE ANALYSIS,
by David B. Wittry. 1964, 25p
Grant AF AFOSR76 63
AFOSR 65-0176

Unclassified report

Pub. in Advances in X-Ray Analysis (U. S.) v7 p395-418 1964 (Copies not available to DDC or Clearinghouse customers)
Proceedings of the Annual Conference on Applications of X-Ray Analysis (12th) held August 7-9, 1963.

Descriptors: (*X-ray spectroscopy, Electron beams), (*Electron beams, X-ray spectroscopy), Fluorescence, Excitation, Scattering, Intensity, X-ray absorption analysis, Mathematical analysis, Corrections.

Methods of quantitative electron probe analysis using empirical working curves have achieved only partial success because of variations in instrument design, analysis conditions, and homogeneity of standards. These problems have been solved for X-ray fluorescence analysis, but many of the more successful empirical methods cannot be used in electron probe analysis; instead, a more theoretical approach is indicated. In electron probe analysis quantitative results can be achieved with only pure elements as standards provided (1) the analysis conditions are carefully selected, (2) the observed intensities can be corrected to obtain the primary intensity actually produced in the specimen, and (3) the relationship of the primary intensity and concentration can be calculated. While present methods of making some of the corrections required improvement and a 'universal' theory for relating the primary X-ray intensities to the concentrations still does not exist, the success achieved with this approach indicates that it should be used to the fullest extent before resorting to calibration curves. Moreover, as information is accumulated, the number of cases requiring the use of calibration curves should diminish, so that eventually it may be possible to perform quantitative analysis in any system with only pure elements as standards.

AD-611 501 Div. 25

Philips Labs., Inc., Irvington-on-Hudson, N. Y.
EVALUATION OF TRUNCATION METHODS FOR ACCURATE CENTROID LATTICE PARAMETER DETERMINATION,
by J. Taylor, M. Mack, and W. Parrish. 13 Sep 63, 18p

Contract AF49 638 620
AFOSR 65-0159

Unclassified report

Pub. in Acta Crystallographica (Denmark) v17 pt10 p1229-45 Oct 1964 (Copies available only to DDC users).

Descriptors: (*Crystal lattices, Determination), (*X-ray diffraction analysis, Crystal lattices), Test methods, Silicon, Tungsten, Crystallography, X-ray spectroscopy, Powders.

The centroid method provides a rational approach to the problem of the accurate determination of lattice parameters. The method requires (1) precise measurement of the line profiles, (2) calculation of the centroid, (3) correction of the centroid for aberrations, goniometer calibration, etc., and (4) knowledge of the centroid of the incident spectral distribution. Four proposed methods for establishing finite limits by truncating a diffraction line profile are reviewed. The methods are evaluated from both a theoretical and practical viewpoint and the superiority of one of the methods is demonstrated. The effects of K beta lines, K alpha satellite lines and the background on the centroid are discussed. Lattice parameters of silicon and tungsten derived using both Fe K alpha and Cu K alpha radiations are given. The results are free of systematic error, and it appears that the centroid method can be used to obtain lattice parameters of greater accuracy than has heretofore been possible, provided accurate spectral centroid data can be obtained. (Author)

AD-611 507 Div. 25, 4

Michigan State Univ., East Lansing.
NUCLEAR RESONANCE STUDIES OF ANTIFERROMAGNETIC LiCuCl3.2H2O,
by R. D. Spence and C. R. K. Murty. 18 Apr 61, 8p
Contract AF49 638 613
AFOSR 560

Unclassified report

Pub. in Physica (Netherlands) v27 p850-56 1961 (Copies available only to DDC users).

Descriptors: (*Lithium compounds, Antiferromagnetism), (*Antiferromagnetism, Lithium compounds), (*Nuclear magnetic resonance, Antiferromagnetism), Cryogenics, Copper compounds, Chlorides, Protons, Nuclear spins, Line spectrum, Magnetic fields, Symmetry (Crystallography), Crystal substructure.

The Li(7) and proton nuclear magnetic resonance in LiCuCl3.2H2O shows this compound to be antiferromagnetic with a Neel temperature of 4.46 ± 0.02K. The local fields at the Li and proton sites combined with the quadrupole splitting of the Li resonance and the dipole-dipole splitting of the proton resonance indicate that the magnetic symmetry group of this crystal must be one of three possible types. (Author)

AD-611 510 Div. 25

Philips Labs., Inc., Irvington-on-Hudson, N. Y.
DEPENDENCE OF LATTICE PARAMETERS ON VARIOUS ANGULAR MEASURES OF DIFFRACTOMETER LINE PROFILES,
by W. Parrish, J. Taylor, and M. Mack.
1964, 21p Contribution no. 214
Contract AF49 638 620
AFOSR 65-0160

Unclassified report

Pub. in Advances in X-Ray Analysis (U. S.) v7 p66-85 1964 (Copies not available to DDC or Clearinghouse customers)

Proceedings of the Annual Conference on Applications of X-Ray Analysis (12th) held August 7-9, 1963.

Descriptors: (*X-ray diffraction analysis, Crystal lattices), (*Crystal lattices, X-ray diffraction analysis), X-ray spectrum, Silicon, Tungsten, X-ray diffraction cameras, Powders.

It is shown that correct interpretation of the Bragg angle measurement requires a consideration of the experimental and the significant aspects of the diffraction process. The use of various angular measures in precision lattice parameter determinations is emphasized.

AD-611 512 Div. 25, 14, 30

Columbia Radiation Lab., New York.
LARGE-APERTURE POLARIZERS AND RETARDATION PLATES FOR USE IN THE FAR ULTRAVIOLET,
by M. N. McDermott and R. Novick. 17 Oct 60,
4p Rept. no. CU-1-62-AF-936-Physics
Contract AF49 638 936
AFOSR 579

Unclassified report

Pub. in Optical Society of America. Journal (U. S.) v51 n9 p1008-10 Sep 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ultraviolet optical materials, Optical properties), (*Polarizing filters, Ultraviolet radiation), Films, Ultraviolet filters, Quartz, Dyes, Polyvinyl alcohol, Mica, Wave transmission.

The ultraviolet properties of films that have useful polarizing properties at wavelengths as short as 215 millimicrons are reported. Large-diameter films may be obtained, and the material is not bleached by intense ultraviolet radiation. The use of stretched polyvinyl alcohol and cleaved mica sheets as retardation plates is reviewed. (Author)

AD-611 513 Div. 25

Harvard Univ., Cambridge, Mass.
FIELD THEORY OF UNSTABLE PARTICLES,
by Julian Schwinger. 21 Aug 59, 25p
Contract AF49 638 589
AFOSR 1787

Unclassified report

Pub. in Annals of Physics (U. S.) v9 n2 p169-93 Feb 1960 (Copies not available to DDC or Clearinghouse customers).
Reported at the International Conference on High Energy Physics(9th) Kiev, U.S.S.R., July 15-25, 1959.

Descriptors: (*Field theory, Elementary particles), (*Elementary particles, Field theory), Green's function, Decay schemes, Bosons.

Using the example of a spinless boson field, the structure of the simplest Green's function is developed to provide a uniform theory of particles, stable and unstable. Some attention is given to the time decay law of unstable particles and it is emphasized tha at a full account of the relevant physical situation must be contained in its mathematical representation, leading to the conclusion that an essential failure of the exponential decay law marks the limit of applicability of the physical concept of unstable particle. There is a brief discussion of the pi and K mesons. (Author)

AD-611 518 Div. 25

National Magnet Lab., Mass. Inst of Tech., Cambridge.

GROUP-THEORETICAL CONSIDERATION OF LANDAU LEVEL BROADENING IN CRYSTALS,
by J. Zak. 20 Apr 64, 5p
Contract AF19 604 7344
AFOSR 65-0166

Unclassified report

Pub. in The Physical Review v136 n3A pA776-80 Nov 2 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Crystals, Atomic energy levels), (*Atomic energy levels, Electron transitions), (*Electron transitions, Groups (Mathematics)), Magnetic fields, Field theory, Perturbation theory, Electric fields, Quantum mechanics, Hamiltonian, Operators (Mathematics), Integral transforms.

A group-theoretical classification of the energy levels for a Bloch electron in a magnetic field is given. The fact is used that the magnetic translation group is a subgroup of the symmetry group for a free electron in a magnetic field, and it is shown that the broadening of the Landau levels in crystals is a general feature that follows from symmetry considerations. An explicit formula for the broadening in the case of cubic symmetry was derived. (Author)

AD-611 519 Div. 25, 15

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
SPIN EFFECTS ON THE LONG-WAVELENGTH OSCILLATIONS OF A QUANTUM PLASMA IN A MAGNETIC FIELD,
by Norman J. Horing. 4 May 64, 6p
Contract AF19 604 7344
AFOSR 65-0165

Unclassified report

Pub. in The Physical Review v136 n2A pA494-9 Oct 19 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasma oscillations, Magnetic fields), (*Electrons, Spin), (*Excitation, Electrons), (*Magnetic fields, Excitation), Green's function, Fourier analysis, Hamiltonian, Magnetic resonance.

The results of earlier work on the quantum theory of electron-gas plasma oscillations in a magnetic field are extended to take account of the difference in masses associated with the orbital and spin parts of the individual electronic motions in the presence of a lattice, and allowance is made for an anomalous electronic g factor. Tractable expressions for the complete plasmon dispersion relation and damping constant (at arbitrary temperature and arbitrary magnetic field strength), which are obtained using a Green's-function formulation of the random-phase approximation, are reported. The low-wave-number (p) approximation of the dispersion relation is investigated in detail. For p=0 the usual result obtains the two plasma modes are shifted to order p squared by terms that are oscillatory in the de Haas-van Alphen (DHVA) sense in the degenerate case. The relative amplitudes for the plasma modes are reported also. The terms which are oscillatory in the DHVA sense are exhibited in terms of an appropriate Fourier series, with no restriction on temperature or magnetic field strength. Moreover, the spectral composition of the DHVA oscillatory terms is thereby explicitly shown to be a sensitive function of g(m/mo), and this result may be useful for the experimental determination of the product of anomalous electronic g factor and effective mass m.

AD-611 520 Div. 25

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
SIGN OF THE MAGNETIC HYPERFINE FIELD IN DILUTE IRON ALLOYS USING THE MOSSBAUER EFFECT,
by Norman Blum and Lee Grodzins. 6 May 64, 5p
Contracts AF19 604 7344, AT30 1 2098
AFOSR 65-0167

Unclassified report

Pub. in The Physical Review v136 n1A pA133-7 Oct 5 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hyperfine structure, Iron alloys), (*Iron alloys, Hyperfine structure), (*Mossbauer effect, Hyperfine structure), Magnetic fields, Absorption spectrum, Decay schemes, Gamma rays, Cobalt alloys, Copper alloys, Gold alloys, Chromium alloys, Isotopes, Molybdenum alloys, Rhodium alloys, Cryogenics.

The sign of the hyperfine field in several dilute iron alloys has been determined. The technique makes use of the Mossbauer effect, which is used to establish the helicity of gamma rays emitted and absorbed in a longitudinal magnetic field. Experiments were performed which show that the field induced at the iron nucleus by the application of an external magnetic field H sub O is negative (i.e., opposite to H sub O) in Mossbauer sources of Co57 in Cu and Au and in absorbers of Mo and Rh containing about 1% Fe57. The spontaneous field H sub int observed in a 1/2% Fe57-in-Cr alloy below 50K is positive. (Author)

AD-611 523 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CERTAIN OPTICAL AND ELECTRICAL PROPERTIES OF THIN INDIUM ANTIMONIDE LAYERS,
by V. A. Kasyan and M. V. Kot. 29 Jan 65, 14p
FTD-TT-64-850
TT 65-61768

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Fizika (USSR) 1963, no. 5, p. 14-20.

Descriptors: (*Semiconducting films, Manufacturing methods), (*Indium alloys, Semiconducting films), (*Antimony alloys, Semiconducting films), USSR, Electrical properties, Optical properties, Temperature, Electrical conductance, Hall effect, Magnetic properties, Light transmission, Electron transitions, Measuring devices (Electrical and Electronic).

This report describes a method of obtaining indium antimonide layers of n-type with a mobility of electrons of up to 8500 sq cm/v.sec. Given are results of measuring the temperature dependence of electroconductivity, Hall constant and magneto resistances in the temperature range of from 140-550K, and also light permeability in the range of wave lengths of 0.7 - 8.1 microns. It is shown, that the obtained layers can be used for the manufacture of Halls EMF sensing elements. (Author)

AD-611 525 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command Wright-Patterson AFB, Ohio.

REPORTS OF THE ACADEMY OF SCIENCES OF UKRAINIAN SSR 1961, No 1: SELECTED ARTICLES, by L. F. Shulezhko, G. M. Savin and O. M. Guz'. 15 Feb 65, 16p FTD-TT-64-919 TT 65-61770

Unclassified report

Unedited rough draft trans. of Akademiya Nauk URSR, Kiev. Dopovidi, 1961, no. 1, p. 10-14, 54-58.

Descriptors: (*Cylindrical bodies, Stability), (*Structural shells, Stresses), Vibration, Perturbation theory, USSR.

Contents: Raising the Stability of Flexible Plates and Cylindrical Panels with the Aid of Vibrations; Concentration of Stresses Around an Elliptical Hole in a Spherical Shell.

AD-611 533 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DESIGNING MINIMUM-WEIGHT SHELLS, by F. G. Shamiev. 8 Feb 65, 9p FTD-TT-64-953 TT 65-61778

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Azerbaidzhanskoi SSR, Baku. Izvestiya. Seriya Fiziko-Matematicheskikh i Tekhnicheskikh Nauk, 1963, v. 16, no. 5 p. 37-41.

Descriptors: (*Structural shells, Weight), Design, Cylindrical bodies, USSR.

The condition of yield for the maximum tangential stress and the maximum applied stress can be used for obtaining the lower and upper estimates of the limiting loads on plates and shells. In the present work the condition of yield of the maximum a plied stress is used for obtaining the lower limit in the problem of designing cylindrical sheils of minimum weight. The upper limit for the given problem has been obtained.

AD-611 569 Div. 25, 14, 30
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Research Labs., Pittsburgh, Pa.
DETERMINATION OF ENERGY RELEASE RATE FOR BIAXIAL BRITTLE FRACTURE SPECIMEN, by A. J. Bush and W. K. Wilson. Aug 64, 30p WERL-8844-2
Contract NObs78844

Unclassified report

Descriptors: (*Fracture (Mechanics), Test equipment), Energy, Brittleness, Plasticity, Loading (Mechanics), Strain (Mechanics), Strain gages.

A compliance study was made on a 4X biaxial specimen to determine the numerical factor in the expression used for the energy release rate for the biaxial brittle fracture specimen developed by M. J. Manjoine (ASME paper 64-METS-3). The variation of the numerical factor with crack length or notch depth was also determined. For the standard geometry specimen, the factor was found to be .722. This vlaue is approximately the same as that determined in another recent study at the Research Laboratories by A. M. Wahl, M. M. Leven, and W. K. Wilson. (WERL-8844-1). (Author)

AD-611 573 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Naval Research Lab., Washington, D. C.
NORMAL MODE THEORY FOR THREE-DIRECTIONAL MOTION.
Interim rept.,
by P. F. Cunniff and G. J. O'Hara. Jan 65, 40p Rept. no. NRL-6170
Proj. SF013 10 01 2960

Unclassified report

Descriptors: (*Motion, Theory), (*Elasticity, Structures), (*Structures, Motion), Dynamics, Loading (Mechanics), Stresses, Vibration, Moment of inertia, Mathematical analysis, Algebra.

Normal mode theory is applied to undamped linear elastic structures represented as lumped parameter systems undergoing translational motion in three directions. The derived equations are primarily concerned with the response of such structures subject to applied forces and base motions and the inertia forces required to calculate stress in each mode of vibration. Additional relationships are presented for special types of loading and for the effective mass acting in a given mode due to base motion. Similar equations are summarized in an appendix for structures with six directions of motion, namely, three translational directions and three rotational directions subject to prescribed assumptions. (Author)

AD-611 576 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN ESTIMATE OF THE ABSORPTION MEAN FREE PATH FOR A PHOTON IN A GAS, by H. E. Moses. 4 Feb 65, 17p
Group rept. 1965-13
Contract AF19 628 500, ARPA Order 600
ESD TDR-65-42

Unclassified report

Descriptors: (*Photons, Absorption), (*Gases, Absorption), (*Absorption, Photons), Atoms, Ground state, Excitation, Selection rules, Doppler effect, Energy, Momentum, Emissivity, Quantum mechanics, Line spectrum.

A photon which is emitted by an excited atom is considered, the atom being surrounded by like atoms in the ground state. In the present paper an estimate is made of how far the photon can travel before it is absorbed by a ground state atom. The selection rules of the atom are used and the Doppler shift in energy and angular momentum of the photon is taken into account. A discussion is presented which indicates how the mean free path gives an indication of whether or not the gas is optically thick. On the basis of the formula which is derived for the mean free path, it is shown that in general gases are more transparent to the shorter wavelengths than the longer ones. (Author)

AD-611 595 Div. 25

National Research Council of Canada, Ottawa (Ontario). Div. of Pure Physics.
ANOMALOUS ROTATIONAL LINE INTENSITIES IN ELECTRONIC TRANSITIONS OF POLYATOMIC MOLECULES: AXIS-SWITCHING, by J. T. Hougen and J. K. G. Watson. 26 Oct 64, 24p Rept. no. NRC-8234

Unclassified report

Pub. in Canadian Journal of Physics v43 p298-320 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Molecular rotation, Electron transitions), (*Electron transitions, Polyatomic molecules), Molecular structure, Molecular spectroscopy, Line spectrum, Matrix algebra.

It is convenient when performing calculations on a vibrating and rotating molecule to define an axis system which is somehow fixed to the molecule. The orientation of the usual molecule-fixed axis system, however, depends not only upon the instantaneous positions of the nuclei, but also upon the equilibrium positions from which the nuclei are regarded as being displaced. Thus, when a molecule of low enough symmetry undergoes an electronic transition accompanied by a change in geometry, it will, in general, be necessary to consider two molecule-fixed axis systems, corresponding to the two different electronic states. This change in axis system from one electronic state to another will be called axis-switching. The two axis systems can be related to each other by the 3 X 3 rotation matrix which brings them into coincidence. The elements of this matrix are functions of the equilibrium geometries of the two electronic states as well as of the instantaneous positions of the atoms in the molecule. Axis-switching leads to departures from the usual expressions for the intensities of rotational lines, the effects of which are most noticeable in near-symmetric tops. The forbidden subbands occurring in the 2 400 A system of acetylene can be satisfactorily explained by axis-switching. Axis-switching effects may also be present in the spectra of HCN, HSiCl, and HSiBr. (Author)

AD-611 598 Div. 25

National Research Council of Canada, Ottawa (Ontario). Div. of Pure Physics.
THE ANOMALOUS STARK EFFECT OF FLUOROFORM IN THE NU6=1 VIBRATIONAL STATE,
by C. C. Costain. 27 Oct 64, 7p
Rept. no. NRC-8241

Unclassified report

Pub. in Canadian Journal of Physics v43 p244-9 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Molecular spectroscopy, Fluorine compounds), (*Fluorine compounds, Molecular spectroscopy), Perturbation theory, Dipole moments, Line spectrum, Electric moments, Selection rules, Quantum mechanics, Vibration.

It is shown that the paper of Maes and Amat, which explains the anomalous frequencies of the NU6, J = 2 to 1, K = 0 lines in CHF3 and CDF3 by taking into account a strong mixing of K = 0 and K = 2 levels, also predicts accurately, the Stark effect of these transitions. In addition, the perturbing J = 2, K = ±2, l = ±1 level of the v6 = 1 vibration of CHF3 has been found at the position they predict. Further examination of the NU3 + NU6, J = 2 to 1 line has removed the uncertainty in the assignment of the NU3 + NU6 and NU2, J = 1 to 0 transitions. (Author)

AD-611 614 Div. 25

Johns Hopkins Univ., Baltimore, Md.
CROSS SECTIONS FOR THE SINGLE CHARGE TRANSFER OF DOUBLY-CHARGED RARE-GAS IONS IN THEIR OWN GASES,
by G. R. Hertel and W. S. Koski. 12 Feb 64, 1p
Contract AF49 638 1301
AFOSR 65-0235

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v40 n11 p3452-3 Jun 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ions, Helium group gases), (*Helium group gases, Ions), Ion beams, Electron transitions, Spectrum analyzers.

In the case of doubly charged ions passing through their own gases at relatively low energies, cross-section measurements of single-electron transfers require experimental techniques which differentiate between the single charge transfers and the resonant double exchanges.

AD-611 621 Div. 25

Illinois Univ., Urbana.
WARM-CARRIER RESISTIVITY IN IMPURE n-InSb IN A MAGNETIC FIELD,
by D. Matz and F. Garcia-Moliner. 20 Jul 64, 18p
Grant AF AFOSR328 63
AFOSR 65-0181

Unclassified report

Pub. in Physica Status Solidi (Germany) v7 p205-22 1964 (Copies available only to DDC users). Research supported in part by the National Science Foundation, Washington, D. C.

Descriptors: (*Semiconductors, Resistance (Electrical)), (*Indium alloys, Antimony alloys), Electrons, Photons, Scattering, Magnetic fields, Impurities, Ionization, Electrical conductance, Optical phenomena, Mathematical models.

The influence of a transverse magnetic field on the warm carrier behavior of the conductivity and resistivity is studied for different scattering mechanisms. An electron temperature model of the Shockley type is used throughout. For a calculation of the conductivity, the coefficient Beta of the quadratic deviation from Ohm's law vanishes in high magnetic fields. For a calculation of the resistivity it saturates to a constant value (not including quantization). Only for polar optical scattering at low temperatures the saturation value has opposite sign to that of Beta in a low magnetic field. The theory is applied to some resistivity measurements in impure n-InSb at 77K. It is concluded that these can be essentially explained by a combination of polar optical scattering and ionized impurity scattering. An explicit account of compensation between donor and acceptor impurities is essential to explain the difference between the results for different samples at magnetic fields above 2 kG, where it is easiest to obtain a good quantitative agreement with experiment. The low magnetic field data are harder to understand, because of the difficulty in describing polar scattering in sufficient detail. (Author)

AD-611 623 Div. 25

National Research Council of Canada, Ottawa (Ontario). Div. of Pure Physics.
THE ABSORPTION SPECTRUM OF NO2 IN THE 3 700-4 600 A REGION,
by A. E. Douglas and K. P. Huber. 15 Oct 64, 11p
Rept. no. NRC-8217

Unclassified report

Pub. in Canadian Journal of Physics v43 p74-81 Jan 1965 (Copies available only to DDC users).

Descriptors: (*Nitrogen compounds, Absorption spectrum), (*Absorption spectrum, Nitrogen compounds), Dioxides, Electron transitions, Atomic energy levels, Band spectrum, Molecular spectroscopy.

An investigation of the absorption spectra of both (14)NO2 and (15)NO2 has revealed a long progression of red-degraded bands in the region 3 700-4 600 A. The rotational analysis shows that these bands are the K sub a = 0 to 1 subbands of the electronic transition (2)B sub 1 to (2) A sub 1. The interpretation of the bands is discussed, and a few remarks concerning the onset of predissociation at 3 979 A are added. (Author)

AD-611 625 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
A COMPLETE STRESS FUNCTION SOLUTION IN THE DYNAMIC LINEAR THEORY OF INCOMPRESSIBLE ELASTIC BODIES,
by George M. C. Fisher. Feb 65, 9p
Technical rept. no. TR-97
Contract Nonr56210, Proj. NR064 406

Unclassified report

Descriptors: (*Elasticity, Theory), Dynamics, Stresses, Viscoelasticity, Functions.

Through a method of C. Somigliana (Atti Reale Accademia Lincei, Roma, Ser. 5, 1, 2, 111, 1892), a complete stress-function solution and an associated displacement decomposition are given for the linearized theory of dynamic incompressible elasticity. (Author)

AD-611 630 Div. 25, 8
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Syracuse, N. Y.
SEMICONDUCTOR DEVICE CONCEPTS.
Scientific rept. no. 9 (Final) Aug-Oct 64,
by Hugh H. Woodbury, Manuel Aven, Robert N. Hall, Richard Baertsch, and Frederick K. Heumann. Nov 64, 27p Rept. no. 64-GC-0296-G
Contract AF19 628 329, Proj. 4608, Task 460805
AFCRL 64-1007

Unclassified report

See also AD-603 783.

Descriptors: (*Semiconductor devices, Preparation), (*Lasers, Semiconductors), Zinc compounds, Selenides, Tellurides, Impurities, Selenium, Aluminum, Gallium alloys, Arsenic alloys, Electrical properties, Electroluminescence, Crystal growth, Optical properties, Phosphorus alloys, Diffusion, Diodes (Semiconductor), Tellurium, Frequency modulation, Absorption spectrum, Crystal lattice defects.

Mixed crystals of ZnSe and ZnTe have been synthesized by the vapor phase growth method. The ZnSexTe(1-x) crystals can be made in both n- and p-type conductivity form in the approximate composition range of 0.4 < or = x < or = 0.6. The crystals are p-type as grown and can be converted to n-type form by doping with Al. Low resistivity n-type crystals exhibit a donor ionization energy of approximately 0.01 ev. Low resistivity p-type crystals have shown ionization energies between 0.035 and 0.044 ev. P-n junctions fabricated from the grown crystals have shown red electroluminescence with a visibility threshold of about 1.4 volts at room temperature. FM junction laser structures have been assembled and tested. Attempts to produce significant amounts of frequency modulation have thus far been unsuccessful due to excessive photocurrents in the modulating section. Studies on the halogen transport synthesis of GaAs and GaAs(x)P(1-x) have continued. A number of GaAs ingots doped with tellurium have been made. No correlation between electrical parameters and threshold currents was found. However, material with high threshold currents appears to have a large number of etch pits and cracks. This is also true for the GaAs(x)P(1-x) alloys. It thus appears that strains and imperfections in the crystals affect their laser behavior. (Author)

AD-611 634 Div. 25

Purdue Univ., Lafayette, Ind. School of Aeronautical and Engineering Sciences.
NONLINEAR THEORY OF MICRO-ELASTIC SOLIDS. II.,
by E. S. Suhubi and A. Cemal Eringen. 6 Jan 64, 17p Technical rept. no. TR-24
Contract Nonr110023

Unclassified report

Pub. in International Journal of Engineering Science (U. S.) v2 p389-404 1964 (Copies available only to DDC users).

Descriptors: (*Elasticity, Solids), (*Solids, Theory), (*Microstructure, Solids), Stresses, Strain (Mechanics), Field theory, Deformation, Mechanical waves, Propagation, Partial differential equations, Tensor analysis.

Interrelations are established of various material and spatial measures of strain. Explicit forms of constitutive equations are obtained for isotropic microelastic materials. Two sets of field equations are derived in terms of uncoupled macro- and micro-displacements and are applied to the study of the Rayleigh surface waves in microelasticity.

AD-611 641 Div. 25

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
PERTURBATION OF A PLASMA BY A PROBE,
by John F. Waymouth. 17 Aug 64, 12p
Contract DA36 039AMC03200E

Unclassified report

Pub. in Physics of Fluids (U.S.) v7 n11 p1843-54 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasma medium, Perturbation theory), (*Probes (Electromagnetic), Plasma medium), (*Perturbation theory, Plasma medium), Plasma sheath, Electrostatics, Electrons, Electric currents, Voltage.

The theory of the electrostatic probe immersed in a plasma is discussed under the assumptions that particle mean free paths are comparable with or smaller than probe radius. The range of validity of the results is for lambda/r < 10, r/100 > 1, lambda/L > 10, where r is probe radius, lambda is particle mean free path, and L is the Debye length. In the limit of lambda/r approaching infinity, the results converge toward the Langmuir result for the same probe. The probe-current vs voltage characteristic obtained when mean free paths are short is distorted because the degree of perturbation of plasma density and potential vary with probe voltage. An unexpected result is that the shape of the probe characteristic in the vicinity of the 'knee' is sensitive to ion temperature, and may possibly be used to determine the ion temperature. (Author)

AD-611 642 Div. 25

Purdue Univ., Lafayette, Ind.
EXPERIMENTAL DETERMINATION OF THE ENERGY

DISTRIBUTION FUNCTIONS AND ANALYSIS OF THE ENERGY-LOSS MECHANISMS OF HOT CARRIERS IN p-TYPE GERMANIUM,
by William E. Pinson and Ralph Bray. 6 Jul 64, 19p
AROD 3655 6

Unclassified report

Pub. in Physical Review (U. S.) v136 n5A pA1449-A66 Nov 30 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Germanium, Transport properties), (*Solid state physics, Germanium), Energy, Statistical functions, Absorption spectrum, Infrared radiation, Valence, Band spectrum, Optics, Phonons, Crystal lattices, Semiconductors, Electron transitions, Anisotropy.

A description of an experimental determination of the energy distribution functions of hot holes in germanium, and the application of the results to the analysis of the dominant scattering and energy-loss mechanisms is given. The distribution functions are obtained from the study of the modulation of the free-hole, intervalence-band absorption of infrared radiation by application of pulses of high electric field. Three features of the experimental distributions stand out: (a) the non-Maxwellian character, typified by the relatively small number of high-energy carriers, (b) the slow rise in average energy from 0.01 to 0.028 eV as the field strength is raised to 2000 V/cm, and (c) the large ratios of drift to root-mean-square velocity v sub d/v sub rms>or equivalent 0.4 for E>400 V/cm, corresponding to strong displacement of the hole distributions in momentum space. These features, together with energy-loss rate calculations, substantiate the importance of inelastic scattering and the dominant role of optical-phonon interactions. A picture of the steady-state hot-carrier effect emerges, emphasizing a cyclic streaming motion of holes in k space, in contrast to the usual diffusion formulation. Briefly indicated are some consequences of this picture regarding the relative population of light and heavy holes, the anisotropy of infrared absorption and hot-carrier mobility, and the efficiency of impact ionization of deep-lying acceptors.

AD-611 651 Div. 25, 8

Army Electronics Labs., Fort Monmouth, N. J.
QUANTUM NOISE,
by I. R. Senitzky. 1962, 6p

Unclassified report

Reprint from unknown journal (Copies available only to DDC users).

Descriptors: (*Quantum mechanics, Noise (Radio)), (*Noise (Radio), Quantum mechanics), Amplifiers, Photons, Electromagnetic waves, Correlation techniques, Quantum statistics.

AD-611 654 Div. 25

Harvard Coll., Cambridge, Mass. Observatory.
SHOCK-TUBE DETERMINATION OF AUTOIONIZATION LIFETIME AND OSCILLATOR STRENGTHS OF THE 3s2 3p(2)Po-3s 3p(2) (2)S1/2 DOUBLET OF A1 I,
by W. H. Parkinson, E. M. Reeves and W. R. S. Garton. 18 Apr 64, 13p
Contract Nonr186648; Grant NsG438

Unclassified report

Pub. in Astrophysical Journal (U. S.) v140 n3 p1269-79 1 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aluminum, Atomic energy levels), (*Atomic energy levels, Aluminum), Ionization potentials, Electron transitions, Atomic orbitals, Shock tubes, Determination, Shock waves, Plasma medium, Great Britain.

The autoionization lifetime of the (2) S sub 1/2 level and f-values of the 3s(2) 3p(2) (2)P(o)-3s3p(2) (2)S 1/2 doublet of A1 (1) were measured by a shock-tube method. The lines of the doublet have a large natural width with a measured autoionization lifetime of 1.1 x 10 - 13 power sec. The f-values were determined as 0.033 for the 1936-A line and 0.049 for the 1932-A line. (Author)

AD-611 659 Div. 25, 8

Army Electronics Labs., Fort Monmouth, N. J.
LOSS MEASUREMENTS WITH A BEAM WAVEGUIDE FOR LONG DISTANCE TRANSMISSION AT OPTICAL FREQUENCIES,
by G. Goubau and J. R. Christian. 7 Oct 64, 1p

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (Gt. Brit.) v52 n12 p1739 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Waveguides, Light transmission), (*Light transmission, Waveguides), Propagation, Beam (Electromagnetic), Lasers, Degradation, Attenuation, Controlled atmospheres, Millimeter waves, Resonators, Impedance matching, Optical properties.

Results demonstrate that optical transmission by beam waveguide yields substantially lower losses than millimeter transmission by circular waveguide.

AD-611 670 Div. 25, 16, 20

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
SCREENING EFFECTS IN ELASTIC ELECTRON SCATTERING,
by Elmar Zeitler and Haakon Olsen. 16 Jul 64, 8p
Proj. 3A012501A818

Unclassified report

Pub. in Physical Review (U. S.) v136 n6A pA1546-52 14 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrons, Elastic scattering), (*Elastic scattering, Nuclear cross sections), Atomic properties, Nuclear spins, Relativity theory, Field theory, Numerical analysis.

In elastic electron scattering atomic screening is shown to affect the cross section both at very small and at very large angles. However, for energies above approximately 200 keV the large-angle screening effects are small, and the cross section may be written as a product of two factors, one depending on the screening effect only and the other on the spin and relativistic effects only. The cross section thus obtained is shown to be in good agreement with previous exact numerical calculations for all angles and all elements. Approximate expressions for large-angle scattering are obtained. (Author)

AD-611 680 Div. 25, 2

Pacific Naval Lab., Esquimault (British Columbia).

UNDERWATER BACKSCATTERING STRENGTHS OF ARCTIC PACK ICE,
by A. R. Milne. 4 May 64, 7p PNL Reprint 64-7
Unclassified report

Pub. in Acoustical Society of America. Journal (U.S.) v36 n8 p1551-6 Aug 1964 (copies not available to DDC or Clearinghouse customers).

Descriptors: (*Underwater sound, Scattering), (*Ice, Arctic ocean), Measurement, Reflection, Audiofrequency, Extremely low frequency.

The backscattering strengths under Arctic sea ice for octave bands between 12 cps and 4 kc/sec were measured, using explosive sound sources. The measurements were made from a camp established in April 1962 on broken and pressure-packed one-year ice over the Canada Deep. For grazing angles between 5 degrees and 14 degrees, results show a dependence of scattering strengths both on grazing angle and on frequency. The dependence on grazing angle is small in frequencies above the 0.5- to 1-kc/sec band and large in the 12- to 25-cps band. (Author)

AD-611 681 Div. 25

Stanford Univ., Calif. Div. of Engineering Mechanics.
TURNING-POINT PECULIARITIES IN THE NEAR-RESONANT RESPONSE OF SLIGHTLY TAPERED MEMBRANE STRIPS,
by J. N. Goodier and F. B. Fuller. 7 Feb 64, 6p
Contract Nonr 22529
Unclassified report

Pub. in Journal of the Acoustical Society of America (U. S.) v36 n8 p1491-5 Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Membranes, Wave transmission), (*Wave transmission, Membranes), Electric filters, Motion, Taper, Numerical analysis.

Unusual and surprising features of the response of a slightly tapered, nearly rectangular membrane, or analogous medium, excited at either the wider end or the narrower end and fixed on the other three sides are examined analytically. Radical differences between the two appear for the same 'near-resonant' frequency. For excitation at the wider end, there can be a large-amplitude response in the wider half, while the narrower half remains almost undisturbed. For excitation at the narrower end, there is only small-amplitude response throughout. These peculiarities are associated with the presence of a 'turning point,' in the sense of the WKB method used in the analysis. (Author)

AD-611 691 Div. 25, 2

Woods Hole Oceanographic Institution, Mass.
SOME DEEP-WATER SOUND-TRANSMISSION PATHS SOUTH OF CYPRUS,
by Lincoln Baxter, II, Robert Brockhurst, and Earl E. Hays. 20 Jul 64, 7p Contribution no. 1525
Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n11 p2124-30 Nov 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sound transmission, Underwater sound), (*Underwater sound, Sound transmission), Cyprus, Mediterranean Sea, Acoustics, Propagation, Velocity, Intensity, Graphics, Marine geophysics.

Deep-water sound-transmission paths extending in range through two convergent zones in the Mediterranean Sea south of Cyprus have been recorded by a new method that permits high-resolution nearly continuous observation of travel-time difference from a rapidly moving sound source as a function of elapsed time. Striking confirmation of some travel-time relations discussed by previous authors are presented. The paths near Cyprus differ from those in the Atlantic because the Mediterranean skip distance is about twenty miles and the axis of the deep-sound channel is only about 1000 ft deep. A number of additional features of the bottom-reflected path are clearly indicated. The details of the refracted path indicate scattering that blurs the refracted caustic and permits reception of weak refracted arrivals at lesser ranges and travel times than predicted by simple ray computations. (Author)

AD-611 692 Div. 25

Johns Hopkins Univ., Baltimore, Md.
SIMPLE METHOD FOR OBSERVING AUDIO-FREQUENCY RESONANCES AND SOUND BEAMS IN CRYSTALS,
by Edwin R. Fitzgerald. 20 Jul 64, 5p
Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n11 p2086-89 Nov 64 (Copies not available to DDC or Clearinghouse customers).
Research supported, in part, by U.S. Office of Naval Research.

Descriptors: (*Acoustics, Crystals), (*Sound generators, Crystals, (*Crystals, Acoustics), Audiofrequency, Resonance, Sound, Crystal structure, Measuring devices (Electrical and Electronic).

A very simple, inexpensive, and easily duplicated method for observing audiofrequency resonances in small samples of poly and single crystals is described. In single crystals, audiofrequency sound beams in line with one of the slip directions of the crystal are sometimes observed. The existence of the resonances and beams is attributed to the presence of internally generated particle (de Broglie) waves propagating through the crystals since the samples tested were much too small to have normal (elastic) wave modes in the frequency range of the measurements. (Author)

AD-611 714 Div. 25

Royal Military Coll. of Canada, Kingston (Ontario).
THE PENETRATION OF MAGNETIC FLUX INTO SUPERCONDUCTING INDIUM,
by D. C. Baird. 20 Apr 64, 7p
Unclassified report

Pub. in Canadian Journal of Physics v42 p1682-6 Aug 1964 (Copies available only to DDC users).

Descriptors: (*Magnetic fields, Penetration), (*Superconductors, Magnetic properties), (*Indium, Superconductors), Cryogenics.

The purpose of these experiments was to study the mechanism by which magnetic flux penetrates into a type I superconductor. The specimens were in the form of disks with an axial magnetic field. The mode of penetration in cases with this geometry has been studied by DeSorbo and Healy (1961), who observed initial circumferential penetration of the flux, followed by extensive invasion of the central area of the specimen by flux bundles. Formation of such flux bundles has been considered by Faber (1958).

AD-611 721 Div. 25

Defense Research Lab., Univ. of Texas, Austin.
UNDERWATER SOUND REFLECTION FROM LAYERED MEDIA,
by G. R. Barnard, J. L. Bardin, and W. B. Hempkins.
8 Jun 64, 6p Acoustical rept. no. 241
Contract Nobsr72627

Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n11 p2119-23 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Underwater sound, Reflection), (*Sound transmission, Underwater sound), Water tanks, Acoustics, Velocity, Attenuation, Measurement, Mathematical models.

Underwater sound-reflection experiments were conducted in an 8-ft-diam, 7.16-ft-deep laboratory tank equipped with a transducer positioning system. A 5-in.-diam shaded, circular piston operating at 100 kc/sec was used to insonify layers of various fluid and solid media supported near the bottom of the tank by a 4x4-ft tray. Measurements were made to determine the reflection coefficients as a function of grazing angle for several models of layered media. These experimental results are compared with calculated values using modified versions of the equations presented earlier by Brekhovskikh. In each experiment, the sound velocity and attenuation were known for each layer and these values used in the calculations. When plane, bounded waves are incident upon well-defined layers of isovelocity, uniform density materials, the relatively simple layered mathematical models presented are sufficient to describe the experimental results. (Author)

AD-611 729 Div. 25, 4

Rensselaer Polytechnic Inst., Troy, N. Y.
FUSION AND PREFUSION IN SILVER NITRATE,
by G. J. Janz and F. J. Kelly. 5 Jun 63, 3p
Grant AF AFOSR181 63
AFOSR 65-0384

Unclassified report

Pub. in Journal of Physical Chemistry (U. S.) v67 p2848-50 Dec 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Silver compounds, Nitrates), (*Nitrates, Melting), (*Thermochemistry, Silver compounds), (*Phase studies, Silver compounds), Specific heat, Heat of fusion, Enthalpy, Crystal substructure.

The note reports heat capacity data for silver nitrate to bridge the gap between 300 and 438K., and a re-examination of heat of fusion: The significance and interdependence of the structural changes occurring during the transition and fusion processes in the light of recent crystallographic evidence are briefly considered. (Author)

AD-611 734 Div. 25, 2, 15

Massachusetts Inst. of Tech., Cambridge.
NON-RADIAL OSCILLATIONS AND CONVECTIVE INSTABILITY OF GASEOUS MASSES,
by Norman R. Lebovitz and S. Chandrasekhar.
18 Feb 63, 16p
Contract AF49 638 42
AFOSR 4609

Unclassified report

Pub. in Astrophysical Journal (U. S.) v138 n1 p185-99 1 Jul 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gases, Spheres), (*Convection, Gases), (*Oscillation, Gases), Stars, Stability, Equations of state, Specific heat, Differential equations, Integrals, Tensor analysis, Potential theory.

Modes of non-radial oscillation of gaseous masses belonging to spherical harmonics of orders l = 1 and 3 are considered on the basis of the first- and the third-order virial equations. For an assumed Lagrangian displacement the theory predicts the occurrence of modes of oscillation of two different types: modes (belonging to l = 3) which are analogous to the Kelvin modes of an incompressible sphere and modes (belonging to l = 1) which are analogous to those discovered by Pekeris for a homogeneous compressible sphere and which exhibit its convective instability. For the latter modes, the virial equations lead to a characteristic second degree equation for the square of the characteristic frequency whose coefficients are integrals over the variables of the unperturbed configuration, including its superpotential. The theory is applied to the polytropic gas spheres, and it is shown that they are convectively unstable (for the modes belonging to l = 1) if the ratio of the specific heats gamma is less than a certain critical value. The critical values of gamma predicted by the (approximate) theory differ from 1 + 1/n (where n is the polytropic index) by less than 1 per cent over the range of n (< or = 3.5) considered; the extent of this agreement is a measure of the accuracy of the method based on the virial equations and the assumed form of the Lagrangian displacement. (Author)

AD-611 735 Div. 25, 2, 15

Massachusetts Inst. of Tech., Cambridge.
THE EQUILIBRIUM AND THE STABILITY OF THE JEANS SPHEROIDS,
by Norman R. Lebovitz and S. Chandrasekhar.
23 Jan 63, 14p
Contract AF49 638 42
AFOSR 4610

Unclassified report

Pub. in Astrophysical Journal (U. S.) v137 n4 p1172-84 15 May 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gases, Spheres), (*Spheres, Distortion), (*Tides, Distortion), Stars, Stability, Gravity, Oscillation, Tensor analysis, Differential equations.

The equilibrium and the stability of homogeneous masses distorted by the tidal effects of a secondary (of mass M' at a distance R) are re-examined on the basis of the second-order virial equations. In agreement with known results, it is shown that, under circumstances when the figure of equilibrium is a prolate spheroid, there is a maximum value of mu(= GM' /R to the third power) which is compatible with equilibrium. The problem of the small oscillations of these Jeans spheroids is next considered. The characteristic frequencies of oscillation belonging to the second harmonics are determined both in case the mass is considered incompressible and in case it is considered compressible and subject to the gas laws governing adiabatic changes. In the former case, instability sets in when mu attains its maximum value; and in the latter case it sets in before that happens. (Author)

AD-611 743 Div. 25

Minnesota Univ., Minneapolis. School of Chemistry.

COMPLEX REFRACTIVE INDEX OF AN IDEAL MONATOMIC GAS,
by C. Alden Mead. 22 Jan 62, 6p
Contract AF49 638 940
AFOSR 2196

Unclassified report

Pub. in Physical Review (U. S.) v128 n4 p1753-58 Nov 15 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gases, Refractive index), (*Refractive index, Gases), Absorption spectrum, Line spectrum, Integration, Hamiltonian, Equations.

The main results of some previous work of the author on this subject (Phys. Rev. 120:854, 860 (1960)) are rederived in a more rigorous fashion. It is shown that the formal results of the previous work, which permit a detailed calculation of the absorption line shape, are valid under the following assumptions: (a) The average optical behavior of the gas is describable in terms of a refractive index; (b) there is no correlation between the positions of different absorbers, i.e., the gas is ideal. However, it is also shown that the cutoff procedure for handling a divergent integral which appears in the theory must be modified. The modified cutoff procedure leads to a large increase in the theoretically predicted linewidth, in qualitative agreement with experiment.

AD-611 746 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CERTAIN REMARKS ON SPECTRAL ANALYSIS OF NOISES,
by V. M. Zhuravlev. 19 Feb 65, 12p FTD-TT-64-713
TT 65-61786

Unclassified report

Unedited rough draft trans. of Tekhnika Kino i Televideniya (USSR) 1963, v. 7, no. 9, p. 25-29.

Descriptors: (*Noise, Noise analyzers), (*Noise analyzers, Noise), Harmonic analysis, Sound transmission, Mixers (Electronic), Voltage, Fourier analysis.

In this report is substantiated the possibility of employing heterodyne analyzers for spectral analysis of noise. Practical recommendations are given on the use for this purpose of analyzers, intended for studying periodic oscillations. (Author)

AD-611 756 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Kansas State Univ., Manhattan.
SENSITIZED FLOURESCENCE.
Semiannual technical summary rept. no. 3, 1 Jul-31 Dec 64,
by Basil Curnutte, Jr. 31 Dec 64, 8p
Contract Nonr363402, ARPA Order 306 62

Unclassified report

Rept. on Proj. DEFENDER.
See also AD-604 691.

Descriptors: (*Mercury, Fluorescence), (*Fluorescence, Quenching (Inhibition)), (*Thallium, Quenching (Inhibition)), Mercury lamps, Laboratory furnaces, Quartz, Light, Optical phenomena, Equations, Sensitivity.

Another technique for the determination of the total quenching cross section of thallium on mercury fluorescence is described. Results from a single run using this method are compared to previously described results. The procedure for determining the total quenching cross-section is: (a) From the absorption data on the mercury only cell and a mercury-thallium cell at the same temperature determine the mercury number density in the mercury-thallium cell. (b) From the number density of mercury atoms in the cell and the data on the mercury only cell determine the expected scattering, I, at each temperature. (c) Correction for slight changes in geometry between the cells and correction for the transmission of the windows will be a simple multiplicative constant which can be determined at low temperatures, where there is not enough thallium vapor to give any appreciable quenching; thus the scattering I' can be determined.

AD-611 762 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Milan Univ. (Italy).
SURFACES AND DISLOCATIONS IN ALKALI HALIDES.
Final rept. for 1 Oct 62-30 Sep 64,
by R. Fieschi. 30 Nov 64, 59p
Grant AF EOAR63 27
AFOSR 65-0365

Unclassified report

Descriptors: (*Alkali metal compounds, Halides), (*Crystal lattice defects, Alkali metal compounds), (*Surface properties, Alkali metal compounds), Single crystals, Luminescence, Ionic current, Conductance, Absorption spectrum, Paramagnetic resonance, Polarization, Electric discharges, Currents, X-rays, Excitation, Powders, Italy, Dielectric properties, Relaxation time.

Plastic deformation (PD) changes drastically the content of imperfections in solids: the concentration of dislocation, point defects, clusters and of dispersed impurities increases up to some orders of magnitude. In alkali halides these changes affect appreciably most physical properties of the sample. This research dealt mainly with the influence of PD on the thermoluminescence (TL) of alkali halide single crystals; the work was expanded to include the study of TL in undeformed crystals, in order to clarify the nature of the various traps. The influence of plastic deformation on dipolar complexes (Sr++ (+)) in doped samples was studied by means of ionic thermoconductivity (ITC), a method recently conceived. Some work was done also on the absorption edge and on the manganese ESR in deformed samples.

AD-611 763 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Dartmouth Coll., Hanover, N. H.
PVT RELATIONS IN SOLID He3 AND SOLID He4 - FLOW MEASUREMENTS WITH SUPERFLUID HELIUM,
Final rept., 1 Oct 62-31 Dec 64,
by John N. Kidder. 11 Feb 65, 9p
Grant AF AFOSR74 63
AFOSR 65-0387

Unclassified report

Descriptors: (*Helium, Fluid dynamic properties), (*Fluid dynamic properties, Helium), Hydrodynamics, Thermodynamics, Gravity, Velocity, Pressure, Cryogenics, Cavity resonators, Liquefied gases.

The gravitational flow of superfluid helium through 'large' (internal diameter greater than 0.01 cm) capillaries at 0.4K has been studied. The primary purpose of this experiment was to find the form of the pressure gradients as a function of fluid velocity. As expected, a critical velocity, below which the pressure gradient

was zero, was observed. Over a small range of velocities the pressure grandient varied nearly linearly with velocity, and at higher velocities it varied as the velocity squared. We are attempting to explain these results in terms of the creation of vortex rings at the capillary wall. The experiments are being continued with straight glass capillaries instead of spiralled metal ones in hopes of obtaining more consistant results. An improved apparatus has been developed to continue measurements begun at Yale University with Air Force support on the PVT relations in solid helium (AD-408 479). Microwave cavities are being used to measure the pressure as well as the density. An experiment to study the propagation of second sound in rotating rectangular resonators is also described. We hope to measure the Magnus force on superfluid vortices by this technique. (Author)

AD-611 771 Div. 25
CFSTI Prices: HC$4.00 MF$1.00

TRW Space Technology Labs., Redondo Beach, Calif.
RESEARCH OF LASER PUMP AND ENERGY STORAGE TECHNIQUES,
by F. N. Mastrup, R. F. Wuerker, and J. J. Caldwell, Jr.
Feb 65, 131p
Contract AF33 615 1072, Proj. 5237, Task 523703
AL TR-65-22

Unclassified report

Descriptors: (*Lasers, Pumping (Electronics)), (*Pumping (Electronics), Blackbody radiation), (*Blackbody radiation, Pumping (Electronics)), Ablation, Xenon lamps, Flash lamps, Light pulses, Excitation, Ruby, Crystals, Energy, Optics.

A fast high radiance ablating laser pump of novel design has been constructed and its radiative characteristics have been determined. Performance of the lamp for exciting a ruby crystal of 0.580 in. diameter and 8 in. length has been established. Total stimulated emission energies in the range 10 joules to 30 joules, depending on individual rods, have been verified. Laser energy was emitted in times near 25 micro sec. The stimulated emission pulse consisted of a series of spikes highly regular with respect to their mutual separation and peak power. Maximum measured peak spike power was 2.5 x 1,000,000 watts. (Author)

AD-611 783 Div. 25, 7
CFSTI Prices: HC$3.00 MF$0.75

Oklahoma State Univ., Stillwater.
SEPARATION CRITERIA OF A NONLINEAR CONTACT SYSTEM IN A STEADY STATE SINUSOIDAL VIBRATION ENVIRONMENT.
Doctoral thesis,
by Morris Charles Burkhart. May 65, 84p
Contract AF33 608 1097

Unclassified report

Descriptors: (*Electric switches, Vibration), (*Vibration, Electric switches), Separation, Mechanics, Damping, Electric relays, Mathematical models.

A preloaded, idealized set of contacts with a hardening nonlinear restoring element was studied to determine the separation criteria when the set was subjected to a steady state sinusoidal excitation. The criteria were determined theoretically for an undamped set of contacts; the effect of damping on the undamped criteria was studied qualitatively; selected undamped criteria were tested experimentally and the effect of a nonlinear jump response on the theoretical separation criteria was investigated experimentally. The study covered several degrees of nonlinear restoring forces and included the separation criteria of a linear set of contacts as a special case. The separation criteria was determined solely by the contact configuration and preload. The contact response amplitude for nonseparation varies from zero to large values, depending on the contact configuration. The configuration of one rigid and one flexible contact permited no response amplitude without separation while a linear configuration where each contact had the same natural frequency theoretically permits unlimited nonseparation amplitude. An increase of the nonlinearity of the hardening nonlinear restoring element decreased the allowable nonseparation response amplitude.

AD-611 810 Div. 25, 14
CFSTI Prices: HC$3.00 MF$0.75

Minnesota Univ., Minneapolis.
A CORRUGATED ADDITION FOR INCREASED DAMPING IN FLEXURE.
Technical rept. for 15 Jun 60-15 Jun 64,
by P. J. Torvik and B. J. Lazan. Jan 65, 60p
Contract AF33 615 1055, Proj. 7351, Task 735106
ML TR64-373

Unclassified report

Descriptors: (*Damping, Vibration), (*Viscoelasticity, Adhesives), (*Structural parts, Vibration), Shear stresses, Strain (Mechanics), Surface properties, Deflection, Beams (Structural).

Various types of surface additions which incorporate viscoelastic adhesive layers for high damping are reviewed and their limitations discussed. A new type of configuration having the general form of a corrugation is shown to be capable of dissipating large damping energy through cyclic shear in a viscoelastic adhesive layer. Expressions are derived for the energy dissipation in one particular form of this configuration. The optimum geometry for maximum damping is discussed with respect to several critical parameters. Corrugated configurations were constructed and tested to check the theory. Satisfactory agreement was found between the experimental results and the values predicted by the theory for shear strain in the viscoelastic layer, for the large increase in damping associated with the adhesive shear mechanism, and for the optimum thickness of the viscoelastic adhesive for maximum damping. As an indication of the increase in damping realized through the corrugated addition approach, the loss coefficient of an aluminum beam at a cyclic stress of 4000 psi was increased from approximately 0.01 to 0.2 by the corrugated addition. (Author)

AD-611 814 Div. 25, 14
CFSTI Prices: HC$1.00 MF$0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
DIFFUSION OF Zn(2+) IN SINGLE-CRYSTAL MgO,
by B. J. Wuensch and T. Vasilos. 1963, 13p
Contract Nonr426700

Unclassified report

Descriptors: (*Magnesium compounds, Oxides), (*Single crystals, Impurities), (*Refractory materials, Impurities), (*Zinc, Diffusion), Ions, Single crystals, Penetration, Electron diffraction analysis, Heat of activation, Solid solutions, Zinc compounds.

Diffusion coefficients for Zn(2+) in single-crystal MgO were determined in the temperature range 1000-1650C were from concentration gradients obtained with the aid of electron microbeam probe spectroscopy. The variation of the diffusion coefficients with temperature yields an

activation energy for diffusion of 1.85 electron volts, and D sub o = 0.0000148 21. cm/sec. The oxides display appreciable solid solubility in one another, but the range of solid solution of ZnO in MgO greatly exceeds that for MgO in ZnO. (Author)

AD-611 819 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Royal Aircraft Establishment, Farnborough (England).
THE PROPAGATION OF VERY FINE CRACKS,
by M. Ya. Leonov and L. V. Onyshko. Oct 64, 15p
Lib-Trans-1082
TT 65-61789

Unclassified report

O Rasprostranenii Mel'chaishikh Treshchin, trans. of Akademiya Nauk URSR, Kiev. Instytut Mashynoznavstva ta Avtomatyky. Nauchnye Zapiski: Seriya Mashinovedeniya, 1961, v. 7, Voprosy Mashinovedeniya i Prochnosti v Mashinostroenii, no. 7, p. 16-25.

Descriptors: (*Fracture (Mechanics), Solids), Propagation, USSR, Brittleness, Stresses, Mathematical analysis, Elasticity, Deformation, Theory, Models (Simulations), Boundary valve problems.

The effect of a linear dislocation on the breaking strength is investigated for a simplified model of a brittle body. The result is compared with the conclusions made in other work for a different model of a brittle body. The solution of Griffith's problem is verified. (Author)

AD-611 823 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
RHEOLOGY OF POWDERS. PART I. FLOW STUDIES OF POLYSTYRENE SPHERES AND SACCHARIN POWDER THROUGH GLASS TUBES. PART II. BULK TENSILE STRENGTH AND SHEAR STRENGTH STUDIES ON SACCHARIN POWDER AND POLYSTYRENE SPHERES.
Rept. for Feb 61-Sep 62,
by Leonard Cohen and Robert T. Cannon. May 64,
45p Special pub. CRDL-SP-1-47
Task 4C08 03 016 10

Unclassified report

Descriptors: (*Transport properties, Powders), (*Powders, Transport properties), Spheres, Styrene plastics, Crystals, Glass, Pipes, Velocity, Tensile properties, Additives, Surface-active substances, Shear stresses.

A study was conducted of the flow of polystyrene spheres of several particle sizes and of saccharin powder in glass tubes of various lengths and diameters. Polystyrene spheres were selected for study as a reference powder of known particle shape, and crystalline saccharin powder was selected as a representative crystalline material. The bulk tensile strength and shear strength of saccharin powder, and polystyrene spheres, both with or without additives, were compared. Additives to the powders in each instance were Cab-O-Sil and Arquad-2HT, a cationic surface active agent. The bulk tensile strength of saccharin powder without additives increased with compressive stress at a rate 27 times greater than that of the powder modified with additives. The shear strength increased with compressive load at a rate 1.24 times greater for the untreated saccharin powder than for the powder modified by additives. The use of these additives with the polystyrene spheres had little effect, if any, on either the bulk tensile strength or shear strength.

AD-611 829 Div. 25, 8
CFSTI Prices: HC$3.00 MF$0.50

General Electric Co., Syracuse, N. Y.
SEMICONDUCTOR LASER ARRAY TECHNIQUES (SEMLAT).
Quarterly interim rept. no. 2,
by N. E. Collins, R. O. Grubel, C. S. Kim, H. Raillard, and J. M. Smith. Feb 65, 51p
Contract AF30 602 3414, Proj. 4506, Task 450608
RADC TR-64-548

Unclassified report

See also AD-609 064.

Descriptors: (*Lasers, Diodes (Semiconductor)), (*Diodes (Semiconductor), Lasers), Semiconductors, Gallium alloys, Arsenic alloys, Crystals, Cryogenics, Test equipment (Electronics), Optical equipment, Microwave equipment.

This report contains confirmation on the work done in the Second Quarter of the Semiconductor Laser Array Program. Further materials evaluation, construction techniques, and preliminary testing of two - diode arrays are discussed. Considerations leading to specifications of the required cryogenic equipment for testing the ultimate diode array are presented. Testing of single diodes to obtain matched pairs and the appropriate test system to detect microwave beat frequencies are described. Finally, thermal considerations leading to a proper selection of array diode spacing are presented. (Author)

AD-611 830 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Rome Air Development Air Center, Griffiss Air AFB, N. Y.
ACOUSTIC PROPAGATION AT MICROWAVE FREQUENCIES,
by William F. Gavin, Jr. and John R. Miller. Dec 64,
63p Rept. no. RADC TR-64-564
Proj. 5519, DS63 7, Task 551904

Unclassified report

Descriptors: (*Ultrasonic radiation, Microwave frequency), (*Propagation, Ultrasonic radiation), Delay lines, Quartz, Sound transmission, Transducers, Piezoelectric crystals, Zinc compounds, Oxides, Attenuation, Ultrasonic properties, Surface properties, Acoustics.

Techniques for the generation, propagation and detection of sound at microwave frequencies have been investigated. Transmission and reflection experiments with quartz crystals are discussed with the design of a microwave delay line as the final product. Various limitations for the system were discovered and methods of overcoming them were studied. Experiments with zinc oxide transducers were performed in an attempt to overcome the high insertion losses in quartz crystals. Propagation effects in various crystal geometrics were also studied. (Author)

AD-611 831 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Raytheon Co., Waltham, Mass.
GASEOUS LASER RESEARCH.
Interim engineering rept. no. 3, 1 Nov 64-31 Jan 65,

by F. Horrigan, S. Koozekanani, R. Paananen, and D. Warshauer. 31 Jan 65, 50p Rept. no. S-740
Contract AF33 615 1949, Proj. 4156, Task 415608
Unclassified report

See also AD-608 635.

Descriptors: (*Lasers, Gases), (*Xenon, Lasers), Electric current, Excitation, Atomic energy levels, Electron transitions, Infrared radiation, Triodes, Quantum mechanics, Graphics, Tables, Optics, Simulation, Computers.

Emphasis was placed on: (a) spontaneous emission studies of level population dependences on gas pressure, discharge current and tube diameter; (b) laser power output studies as function of the same parameters as in (a); (c) measurements of metastable densities via absorption studies; and (d) investigations of parameter change effects in the computer model of a discharge excited laser system. Results are presented and conclusions are drawn concerning the excitation mechanisms responsible for the laser action in pure xenon discharge excited laser systems. (Author)

AD-611 833 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
A SURVEY OF CESIUM PLASMA RESEARCH,
by John A. Decker, Jr. Dec 64, 44p
Rept. no. ARL-64-220
Proj. 7073, Task 707303
Unclassified report

Descriptors: (*Cesium, Plasma physics), (*Plasma physics, Cesium), Scientific research, Reviews, Probes (Electromagnetic), Ion engines, Bibliographies, Experimental data, Graphics.

A critical survey of past and present research on the plasma physics of cesium is presented. Primary emphasis is placed on the utilization of the unique characteristics of cesium in plasma generation and measurement, including the results of current basic research. In addition reference is made to work of historical interest and to several current applications of cesium plasma technology. (Author)

AD-611 834 Div. 25, 15
CFSTI Prices: HC$4.00 MF$1.00

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
A STUDY OF THE COEFFICIENTS OF THE SPIN PERMUTATION OPERATORS IN THE EFFECTIVE SPIN HAMILTONIAN,
by Thomas C. Collins. Nov 64, 117p
Rept. no.ARL 65-14
Proj. 7885, Task 7885 03
Unclassified report

Descriptors: (*Hamiltonian, Spin), (*Spin, Electrons), (*Electrons, Spin), Quantum mechanics, Perturbation theory, N-body problem, Excitation, Atomic orbitals, Antiferromagnetism, Ferromagnetism, Matrix algebra, Integrals, Solid state physics.

The Heisenberg Spin Hamiltonian is derived for a system of N electrons and a set of fixed ion cores with the Hamiltonian spinfree. The wavefunction has the form Psi = AF H, where A is the antisymmetrizer, F, a function of coordinate space is required to have no symmetry, and H is a function of the spin coordinates. By the use of the representation of the permutation group, the coefficients of the spin permutation operators are written as linear combinations of the S sub n group functions. The formulism is then applied to 3- and 6- electron systems, where the dependence of the S sub n group upon lattice spacing is studied. (Author)

AD-611 851 Div. 25, 14
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
ENERGY TRANSFER IN SILICATE GLASS COACTIVATED WITH CERIUM AND YTTERBIUM,
by H. W. Gandy, R. J. Ginther, and J. Weller.
Jul 64, 7p Rept. no. NRL-MR-1546
ARPA Order 306 62
AD 443 921; N64, 30676
Unclassified report

Descriptors: (*Glass, Excitation), (*Ions, Glass), (*Cerium, Glass), (*Ytterbium, Glass), (*Luminescence, Glass), Atomic energy levels, Silicates, Aluminum compound, Absorption spectrum, Optical properties.

In a study of the optical properties of coactivated luminescent glasses, transfer of energy from UO2(2+) to Nd(3+(1) and from Ce(3+) to Nd(3+(2)) has been observed and it has been shown that for both of these ion pairs this energy interchange is partly achieved by radiationless transfer mechanisms. In this paper the transfer of energy from Ce(3+) to Yb(3+) in a lithium-magnesium-alumino silicate glass host matrix is reported and discussed.

AD-611 861 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB,Ohio.
INTENSIFICATION OF HEAT EXCHANGE IN ELECTRIC FIELDS,
by I. T. Alad'ev and V. A. Efimov. 1 Mar 65, 15p
FTD-TT-64-934
TT 65-61798
Unclassified report

Unedited rough draft trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1963, v. 6, no. 8, p. 125-132.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Thermal conductivity, Electric fields), (*Electric fields, Thermal conductivity), Heat transfer, Intensity, Heat exchangers, Liquids, Boiling, Ions, Polarization, Viscosity, Thermodynamics, USSR.

Recently published reports are summarized on the investigation of electric field effect on the physical properties of certain liquids and their heat exchange. The results of these investigations show, that electric fields in some instances appear to be a powerful medium affecting heat conductivity and heat exchange of low electrically conductive and non electrically conductive liquids. The consumption of energy for the creation of electric fields is very low because of the low values of conductivity current.

AD-611 888 Div. 25

Naval Ordnance Test Station, China Lake, Calif.
EXO-ELECTRON EMISSION DUE TO ULTRASONIC IRRADIATION,

by J. A. M. Langenecker and D. B. Ray.
10 Mar 64, 5p Rept. no. NOTS-TP-3721
NAVWEPS 8672

Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n9 p2586-8 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ultrasonic radiation, Metals), Aluminum, Electrons, Crystal lattice defects, Acoustics, Thermionic emission, Energy conversion, Absorption.

The emission of electrons from metals can be excited through a variety of treatments and stimulated by thermal energy and as shown only recently, by high-intensity ultrasound. Investigations were carried out on disks of 99.999% pure aluminum and aluminum 6061, exposed to acoustic irradiation up to 100 W/sq cm at 20 kc/sec. The peak emission at certain intensity levels of the acoustic field is presented, compared with emission from thermal stimulation, and discussed from the viewpoint of acoustic activation of lattice defects in metal crystals.

AD-611 889 Div. 25

Naval Ordnance Test Station, China Lake, Calif.
REFLECTANCE OF EVAPORATED GERMANIUM FILMS,
by T. M. Donovan and E. J. Ashley. 14 Mar 64,
6p Rept. no. NOTS-TP-3722
Task R360FR106 216 1R011 01 01
NAVWEPS 8673

Unclassified report

Pub. in Optical Society of America. Journal (U. S.) v54 n9 p1141-4 Sep 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Optical properties, Semiconductor films), (*Germanium, Semiconductor films), (*Semiconductor films, Optical properties), Reflection, Evaporation, Processing, Epitaxial growth, Crystals, Single crystals.

The reflectance of evaporated germanium films in the 2650-9000 A wavelength region is reported, and the effect of evaporation conditions, substrate material, and temperature on the observed reflectance is discussed. An expitaxial film grown on a single-crystal germanium substrate has a reflectance nearly identical to that of an undistorted single-crystal surface. Fine structure is observed including the splitting of the 2.1 eV maximum. However, shoulders which appear at 2.47 and 3.25 eV in the single-crystal results do not appear in the epitaxial film results. Highly oriented polycrystalline films formed at 725C show the same fine structure as the epitaxial films, but the magnitude of the reflectance in the region of 2 eV if about 3% lower. The reflectance of polycrystalline films formed on substrates at 325C-625C contains maxima at 4.4 and 2.3 eV, but no fine structure, and amorphous films show only a slight maximum at 4.4 eV. It is possible that crystallite size is important in determining the reflectance spectrum of these films. A room-temperature aging effect was observed with the epitaxial films, which was more pronounced than that observed for polycrystalline and amorphous films. (Author)

AD-611 898 Div. 25

California Inst. of Tech., Pasadena.
METHOD TO INCREASE THE PRESSURE DROP ACROSS A DIFFERENTIALLY PUMPED GAS CANAL,
by H. Winkler. 23 Jul 64, 2p
Contract Nonr22047 Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v35 n11 p1599-600 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gas flow, Pressure), (*Pressure, Gas flow), (*Nuclear spectroscopy, Instrumentation), Gas pumps.

An arrangement is described for increase in pressure drop particularly in open gas targets for nuclear spectroscopy. Apparent conductance of the beam-entrance canal can be decreased by using the momentum of the mass flow of the gas feed into the gas target to build up an additional pressure difference on the high pressure side of the canal. For equal mass flow through the canal, a higher target pressure can be obtained.

AD-611 904 Div. 25, 8, 15

Lockheed Missiles and Space Co., Palo Alto, Calif.
CORRELATION OF AMPLITUDE AND PHASE FLUCTUATIONS FOR WAVE PROPAGATION IN A MEDIUM WITH RANDOM, SPHEROIDAL INHOMOGENEITIES,
by G. C. Knollman. 13 Jul 64, 5p

Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n12 p2306-10 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electromagnetic waves, Propagation), (*Sound, Propagation), (*Correlation techniques, Propagation), Wave transmission, Statistical functions, Transcendental functions, Refractive index, Amplitude modulation, Phase modulation, Phase shift.

A theoretical study is presented of the mutual correlation between amplitude and phase fluctuations when an acoustic (or electromagnetic) wave propagates in a random medium whose correlation function for refractive index is spheroidal-Gaussian. Amplitude-phase correlations are considered for both plane and spherical waves transmitted through a statistically isotropic medium in which the deviations of refractive index about a mean are small. Large-scale inhomogeneities of arbitrary spheroidal shape are treated, and transmitter-to-receiver ranges are taken as large in comparison with the refractive-index correlation length in the transmitter-receiver plane. Comparison is made between the cases of spherical and nonspherical inhomogeneities, for both plane and spherical acoustic waves. The low- and high-frequency extremes of the theory are given special note. (Author)

AD-611 905 Div. 25, 30

Lockheed Missiles and Space Co., Palo Alto, Calif.
MODIFIED SNOWPLOW MODEL FOR COAXIAL PLASMA ACCELERATORS,
by Philip J. Hart. 24 Feb 64, 7p

Unclassified report

Pub. in Journal of Applied Physics (U. S.) v35 n12 p3425-31 Dec 1964 (Copies not available to DDC or Clearinghouse customers).
Presented in part at the San Diego meeting of the Division of Plasma Physics of the APS on 6-9 Nov 1963.

Descriptors: (*Plasma medium, Acceleration), Shock tubes, Electrodes, Capacitors, Density, Velocity, Analog computers, Plasma physics, Gases.

In order to explain previously observed deviations of measured plasma velocities from velocities predicted

by computer solutions based on a snowplow model, (AD-257 819), the experimental and computer data are here extended over a much wider range of electrode configurations, capacitor potentials, and gas densities in the shock tube. At low densities the experimental velocity curves fall below the predicted curves because of material evaporated from insulation and electrodes. At high gas densities the experimental velocity curve for the largest center electrode coincides with the predicted curve, but for center electrodes of successively smaller diameter the measured curves lie progressively farther above, but parallel to, those predicted, up to a factor of 5.5 times for the smallest electrode used. These results are explainable in terms of a modified snowplow model postulating an effective annular region adjacent to the center electrode, whose thickness is of the same order as the electrode radius, such that the force due to the magnetic pressure inside this annulus acts on only the gas contained within it to produce the measured velocity. (Author)

AD-611 910 Div. 25

Illinois Univ., Urbana.
ULTRASONIC ATTENUATION IN SUPERCONDUCTORS CONTAINING MAGNETIC IMPURITIES,
by Leo P. Kadanoff and Igor I. Falko. 13 Jul 64, 11p
AROD 431-66

Unclassified report

Pub. in Physical Review (U.S.) v136 n5A pA1170-80 Nov 30 1964 (Copies not available to DDC or Clearinghouse customers). Revision of rept. dated 24 Jun 64.

Descriptors: (*Ultrasonic radiation, Attenuation), (*Superconductors, Ultrasonic radiation), (*Magnetic materials, Impurities), Green's functions, Equations, Power series, Low frequency.

The Abrikosov-Gor'kov theory for a superconductor with magnetic impurities (Zh. Eksperim. i teor. Phys. (USSR) 39, 1781 (1960)) is applied to the calculation of attenuation coefficients. In this calculation several electronic time-dependent correlation functions are evaluated, and these functions are then used to evaluate the attenuation. In the limit of low sound-wave frequencies, the resulting coefficients are expressed in terms of a single energy integral. The physical significance of the result is discussed in terms of an effective density of 'normal electrons' and energy-dependent mean free paths. Then, the attenuation is evaluated in the limit of low temperatures for superconductors both with and without an energy gap. (Author)

AD-611 911 Div. 25

Illinois Univ., Urbana.
EVALUATION OF HIGH-FREQUENCY ULTRASONIC ATTENUATION IN SUPERCONDUCTORS IN THE BARDEEN-COOPER-SCHRIEFFER THEORY OF SUPERCONDUCTIVITY,
by V. M. Bobetic. 16 Jul 64, 4p
AROD 431-62

Unclassified report

Pub. in Physical Review (U. S.) v136 n6A pA1535-8 Dec 14 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ultrasonic radiation, Attenuation), (*Superconductors, Ultrasonic radiation), High frequency, Integrals, Integration, Theory, Equations.

Calculations are given of the ratio of the attenuations of longitudinal sound waves in the superconducting and normal states according to the BCS theory of superconductivity (Phys. Rev. 108: 1175 (1957)) for an isotropic model at arbitrary frequencies and temperatures. It is predicted that there is a discontinuity in attenuation at a frequency corresponding to the energy gap. (Author)

AD-611 921 Div. 25

Minnesota Univ., Minneapolis. School of Chemistry.
COMMENTS ON THE RESONANCE FLUORESCENCE IN GASES,
by C. Alden Mead and H. F. Hameka. 17 Sep 63, 1p
Contract AF49 638 940
AFOSR 65-0371

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v40 n2 p606 Jan 15 1964 (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with Pennsylvania Univ., Philadelphia.

Descriptors: (*Gases, Fluorescence), (*Fluorescence, Gases), (*Resonance, Gases), Matrix algebra, Excitation, Molecular properties, Determinants, Hamiltonian.

A new theoretical description of resonance fluorescence has been developed and applied to dilute gases and molecular crystals. It was shown that all properties of resonance fluorescence can be derived from a matrix, which was called the damping matrix. The purpose of the report is to make two comments on the treatment of dilute gases.

AD-611 924 Div. 25

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
SPIN SPLITTINGS AND ROTATIONAL STRUCTURE OF NONLINEAR MOLECULES IN DOUBLET AND TRIPLET ELECTRONIC STATES,
by W. T. Raynes. 26 Jun 64, 13p
AROD 3447-8

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n10 p3020-32 Nov 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Polyatomic molecules, Molecular spectroscopy), (*Molecular rotation, Polyatomic molecules), (*Hamiltonian, Polyatomic molecules), Matrix algebra, Qauntum mechanics, Nonlinear systems, Spin, Atomic properties, Excitation, Atomic energy levels, Electron transitions, Absorption spectrum, Band spectrum.

Matrix elements are presented for the Hamiltonian of a nonlinear, nonrigid polyatomic molecule in a multiplet electronic state. Their use is only appropriate for electronic and vibrational spectra. For nonlinear molecules in doublet and triplet electronic states, explicit formulas are presented for (a) the rotational term values of symmetric rotors and (b) spin splittings of asymmetric rotors possessing orthorhombic symmetry. Application of the above formulas to the results of Dressler and Ramsay on the 2B1 ground states of NH2 permits the determination of the spin-rotation parameters of these molecules. All five spin parameters of formaldehyde in its lowest 3A2 state are given together with curves of spin splittings in the lower K levels. The spin parameters of HCHO, NH2, and ND2 are compared with those of NO2 and ClO2 found by recent microwave studies. The surprisingly small value of D1/0.42 cm for the lowest triplet state of formaldehyde is briefly discussed in terms of a breakdown of the orbital approximation for this prototype 'n-pl state.'

AD-611 927 Div. 25

Defense Research Lab., Univ. of Texas, Austin.
ELECTROKINETIC, ACOUSTIC PRESSURE TRANSDUCER,
by Joseph L. Collins and G. E. Ellis. 2 Jun 64, 4p Acoustical rept. no. 240
Contract Nonr357902

Unclassified report

Pub. in Acoustical Society of America. Journal (U. S.) v36 n10 p1858-60 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electroacoustic transducers, Sensitivity), Frequency, Low frequency, Pressure, Design.

This paper discusses a low-frequency, electrokinetic, acoustic pressure transducer, suitable for both airborne- and underwater-sound applications, that uses the principle of electrokinetic transduction. A broad frequency response has been obtained, which extends from 0.001 to 100 cps. A pressure sensitivity of 3.8 micro V/dyn/sq cm (266 mV/psi) is illustrated. (Author)

AD-611 928 Div. 25, 20

Connecticut Univ., Storrs.
MEASUREMENTS OF ELECTRON CAPTURE IN CLOSE H(+)-ON-He AND He(+)-ON-H COLLISIONS,
by Herbert F. Helbig and Edgar Everhart.
4 Jun 64, 6p
AROD 2805 9

Unclassified report

Pub. in Physical Review (U. S.) v136 n3A pA674-9 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electron capture, Nuclear cross sections), (*Nuclear cross sections, Electron capture), (*Proton reactions, Electron capture), (*Helium, Electron capture), Probability, Hydrogen, Lithium, Ions, Nuclear scattering, Nuclear resonance, Field theory, Thermodynamics.

Differential measurements of electron capture probability P sub O are made for close encounters in the reaction H(+)+He yields H+He(+). The energy range of the incident proton is 1.6 to 180.0 keV and the scattering angle is varied from 1/2 to 4 degrees. The impact parameters associated with these collisions extend from 0.015 to about 0.50A. There is little angular dependence to the data. When P sub O plotted versus energy, a damped resonant structure is seen with peaks at 36, 7, and 2.6 keV with amplitudes of 0.52, 0.16, and 0.05, respectively. The phenomena are discussed in terms of the energy-level diagram for HeH(+) and with reference to the existing theories for charge transfer in the nonresonant case. Measurements of the inverse reaction, He(+) ions incident on atomic hydrogen targets, are also presented and discussed. (Author)

AD-611 933 Div. 25

Pittsburgh Univ., Pa.
THEORY OF TRANSPORT PHENOMENA IN AN ELECTRON-PHONON GAS,
by T. Holstein. 28 Apr 64, 128p
Grant AF AFOSR196 63
AFOSR 65-0179

Unclassified report

Pub. in Annals of Physics (U. S.) v29 n3 Oct 1964 p410-535 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gases, Models (Simulations)), (*Transport properties, Gases), (*Phonons, Electrons), (*Electrons, Phonons), Theory, Statistical functions, Hamiltonian, Electrical conductance, Fermions, Quantum mechanics, Determination, Frequency, High frequency, Integrals equations.

A quantal transport theory is developed for a model electron-phonon gas, as described by the Frohlich Hamiltonian. The treatment is focused specifically on the determination of the electrical conductivity, sigma (q, omega) in the presence of an external field of arbitrary wave vector, q, and frequency, omega. The starting point is a generalized Kubo-relationship between sigma (q, omega) and an appropriately defined velocity-correlation function. The perturbation expansion of this function in powers of the electron-phonon interaction is analyzed with the aid of the so-called 'temperature' diagram technique. The problem of computing the correlation function (and hence sigma (q, omega)) is shown to be equivalent to that of solving two coupled linear integral equations.

AD-611 934 Div. 25, 15

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
SMALL FINITE DEFORMATIONS OF VISCOELASTIC SOLIDS,
by A. C. Pipkin. 1964, 8p
AROD 1271-43

Unclassified report

Pub. in Reviews of Modern Physics (U. S.) v36 n4 p1034-41 Oct 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Deformation, Solids), (*Solids, Deformation), (*Viscoelasticity, Solids), Stresses, Strain (Mechanics), Integral equations, Creep, Isotropism, Compressive properties.

The derivation of nonlinear integral stress-deformation relations is reviewed, and the relatively simple forms exhibited which the low-order approximations take if the material is initially isotropic, or if it is incompressible. The constitutive equations are considered for small deformations superposed on an initial large deformation. The related equations for viscoelastic fluids are discussed briefly. Finally, a few remarks on inverse (creep integral) laws are made.

AD-611 944 Div. 25, 30

Poulter Research Labs., Stanford Research Inst., Menlo Park, Calif.
OPTICAL PROBE TECHNIQUES,
by R. C. Goettelman and J. K. Crosby. 11 May 64, 5p
Contract AF08 635 2951

Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v35 n11 p1546-49 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Probes (Electromagnetic), Fiber optics), (*Fiber optics, Probes (Electromagnetic)), (*Timing devices, Fiber optics), Argon, Encapsulation, Light, Signals, Rotating-mirrow cameras, Shock waves, Velocity, Measurement, High-pressure research, Optical equipment.

The application of fiber optics light guides to optical time-of-arrival measurements in the submicrosecond range is described. Methods are given for fabrication of small diameter guides which may be either rigid or

flexible. Argon encapsulation techniques are described which make it possible to generate bright optical signals from flying plate arrivals in vacuum. Examples of applications of the techniques used in conjunction with a rotating mirror streak camera are given and the accuracy obtainable is discussed. (Author)

AD-611 945 Div. 25

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
EMITTANCE MEASUREMENTS OF SOLIDS ABOVE 2000 deg C,
by T. S. Laszlo, R. E. Gannon, and P. J. Sheehan.
1964, 7p
Contract AF49 638 1166
AFOSR 65-0164

Unclassified report

Pub. in Solar Energy (U. S.) v8 n4 p105-11 Oct-Dec 1964 (Copies not available to DDC or Clearinghouse customers).
Presented at the Symposium on Thermal Radiation of Presented at the Symposium on Thermal Radiation of Solids, San Francisco, Calif., Mar 4-6, 1964.

Descriptors: (*Thermal radiation, Solids), (*Solids, Emissivity), (*High-temperature research, Thermal radiation), Solar furnaces, Instrumentation, Blackbody radiation, Measurement, Thermodynamics.

A method of measuring the emittance of solids above 2000 deg C through the use of a solar furnace has been developed. Two techniques involving specialized instrumentation, for performing the necessary measurements were investigated. Initial experiments showed that both techniques were suitable and that the specified instruments were adaptable for making the required measurements. (Author)

AD-611 956 Div. 25

Massachusetts Inst. of Tech., Cambridge.
THE JUMP PHENOMENON OF THE ABSORBED VIBRATIONS OF A NONLINEAR CENTRIFUGAL PENDULUM WITH LARGE ANGLES OF DISPLACEMENT (Il Fenomeno del Salto non Lineare nel Funzionamento degli Assorbitori di Vibrazioni a Pendolo Centrifugo ad Angoli Grandi),
by Jacob P. Den Hartog. 1963, 14p
Grant AF AFOSR154 63
AFOSR 65-0328

Unclassified report

Pub. in Scuola in Azione (Italy) n14 p30-40 1963-1964 (Copies available only to DDC users).
Document in Italian.

Descriptors: (*Oscillation, Differential equations), (*Vibration, Absorption), Harmonic analysis, Gravity, Diesel engines, Loading (Mechanics), Italy.

AD-611 957 Div. 25

Carnegie Inst. of Tech., Pittsburgh, Pa.
p-n HETEROJUNCTIONS.
Revised ed.,
by S. S. Perlman and D. L. Feucht. 15 Nov 63, 16p
Grant DA ARO D31 124G287
AROD 3397 5

Unclassified report

Pub. in Solid-State Electronics (U. S.) v7 p911-23 1964 (Copies available only to DDC users).
Revision of rept. dated 18 Jul 63.

Descriptors: (*Semiconductors, Sandwich construction), Epitaxial growth, Electrical properties, Quantum mechanics, Kinetic theory, Solid state physics, Mathematical models.

A classical kinetic emission model coupled with an assumed energy band diagram which includes the effects of a discontinuity in the electron affinity, effective mass, permittivity and the energy gap at the junction interface is used as the basis for an analysis of the static current-voltage characteristic of the abrupt p-n heterojunction. The derived characteristic is then used to determine regions of quasi-equilibrium within the depletion layer and to predict the position dependence of the quasi-Fermi levels. Two distinct modes of operation are predicted for the heterojunctions I-V characteristic: Metal-semiconductor type operation where the current is limited by the ability of the carriers to surmount the potential barrier at the junction interface and homojunction type operation where the current is limited by the ability of the carriers to diffuse away from the junction depletion region. The predicted extrapolated saturation current for the former type of operation is, in general, significantly less than that for the latter. The position dependence of the quasi-Fermi levels is also different for the two types of operation. For metal-semiconductor type operation a drop in the quasi-Fermi level across the depletion layer is expected, whereas for homodiode type operation there is a negligible variation of the quasi-Fermi level in this region. (Author)

AD-611 964 Div. 25

Eaton Electronics Research Lab., McGill Univ., Montreal (Quebec).
ELECTRON PARAMAGNETIC RESONANCE EXPERIMENTS WITH Ti(3+) IONS IN RbA1(SO4)2.12H20,
by Gerald F. Dionne. 5 May 64, 10p
Grant DRB9512 20

Unclassified report

Pub. in Canadian Journal of Physics v42 p2419-28 Dec 1964 (Copies available only to DDC users). Research partly supported by the National Research Council of Canada, Ottawa (Ontario).

Descriptors: (*Titanium, Paramagnetic resonance), (*Paramagnetic resonance, Titanium), (*Single crystals, Ions), X band, Microwave spectroscopy, Hamiltonian, Spin, Atomic orbitals, Atomic energy levels, Canada, Tensor analysis, Crystal growth, Rubidium compounds, Aluminum compounds, Sulfates, Hydrates.

The paramagnetic resonance spectrum of the Ti(3+) ion in cubic RbAl(SO4)2. 12H2O single crystals was studied in the (100) and (110) planes at 4.2K with an X-band microwave spectrometer. The spectrum, which consists of a maximum of 12 lines, has been explained by considering a model of 12 magnetic complexes which are related to each other through the symmetry elements of the T(h) = (2/m)3 point group of the Rb alum lattice. For the spin Hamiltonian with S = 1/2 three g factors have been determined--1.895, 1.715, and 1.767--within an accuracy of ±0.002, indicating the existence of a crystal electric field of orthorhombic symmetry. (Author)

AD-611 965 Div. 25

Purdue Univ., Lafayette, Ind.
STRESS-INDUCED DONOR DEIONIZATION IN GaAs,
by R. J. Sladek. 1964, 8p
AROD 3655-16

Unclassified report

Pub. in mono. Congres International: Physique des Semiconductors (7th) Paris, 1964. Comptes Rendus, p545-51 (Copies available only to DDC users).

Descriptors: (*Semiconductors, Stresses), (*Gallium alloys, Arsenic alloys), (*Hall effect, Pressure), Impurities, Ionization, Electron transitions, Piezoelectric effect, Mathematical models.

An analysis was made of the Hall effect versus pressure data for various gallium arsenide samples and it was demonstrated that such data can be explained quantitavely in terms of the pressure dependence of the ionization energy and thus degree of ionization of non-shallow donors present in the samples. The pressure dependence of the ionization energy is interpreted as due to the conduction band moving away from the non-shallow donor level. The different behaviors of various samples are interpretated in terms of different kinds and concentrations of impurities determining the charge carrier concentrations. Thus in samples exhibiting large piezo-Hall effects, all the carriers come from non-shallow donors. In samples exhibiting small piezo-Hall effects most of the carriers come from shallow donors, whose ionization energy is relatively insensitive to pressure, and only a few of the carriers come from non-shallow donors. A discussion of the possible nature of the non-shallow donors is also given.

AD-611 966 Div. 25

Massachusetts Inst. of Tech., Cambridge.
BROWNIAN MOTION IN SYSTEMS OF FINITE SIZE,
by Irwin Oppenheim and P. Mazur. 2 Jul 64, 13p
Grant AF EOAR62 99
AFOSR 65-0156

Unclassified report

Pub. in Physica (Netherlands) v30 p1833-45 1964 (Copies available only to DDC users).

Descriptors: (*Statistical mechanics, Particles), (*Particles, Statistical mechanics), Motion, Dynamics, Momentum, Transport properties, Integrals.

The solution of the Langevin equation for a Brownian particle in an arbitrary field of force in a finite system (i.e. in the presence of walls) is related to the solution of the Langevin equation for an infinite system. Analytic expressions for correlation functions of the momentum in the absence of an external field are obtained. The importance of the order of the V approaching infinity and t limiting processes is discussed. (Author)

AD-611 968 Div. 25

Commonwealth Scientific and Industrial Research Organization, New South Wales (Australia).
THE THERMAL EXPANSION OF COPPER AT LOW TEMPERATURES,
by R. H. Carr, R. D. McCammon, and G. K. White.
5 Dec 63, 13p
Grant AF AFOSR391 62
AFOSR 65-0172

Unclassified report

Pub. in Royal Society of London. Proceedings. Series A. Mathematical and Physical Sciences (Gt. Brit.) v280 p72-84 1964 (Copies available only to DDC users).

Descriptors: (*Copper, Thermal expansion), (*Cryogenics, Copper), (*Thermal expansion, Cryogenics), Australia, Measurement, Differential equations, Thermodynamics, Capacitance bridges.

The thermal expansion of copper has been determined at temperatures down to 2 K by means of an electrical capacitance technique. By measuring three-terminal capacitances in a ratio-transformer bridge length changes smaller than 10 to the minus 9 power cm can be detected in the capacitor-expansion cell. The linear expansion coefficient is given for below 10 K. These terms, identified respectively as electronic (e) and lattice (l) in origin, lead to the following values of the Gruneisen parameter: gamma sub e = 0.63±0.06, gamma sub l = 1.72±0.03 (= gamma sub 0). Gamma sub e is compared with a theoretical free-electron value of 2/3, and the low temperature value of gamma sub e is compared with values of 1.75 to 1.77 calculated from elastic constants. At room temperature gamma (approximately = gamma sub infinity) is 2.00, so that gamma sub infinity-gamma sub 0 approximately = 0.28, which agrees well with the theoretical estimates of Barron for a close-packed cubic lattice. (Author)

AD-611 969 Div. 25, 14, 17

Commonwealth Scientific and Industrial Research Organization, Sydney (Australia). Div. of Physics.
THERMAL EXPANSION OF SOLIDS,
by J. G. Collins and G. K. White. 1964, 31p
Grant AF AFOSR391 62
AFOSR 65-0173

Unclassified report

Pub. in mono. Progress in Low Temperature Physics (Amsterdam) v4 chap. 9 p450-79 1964 (Copies available only to DDC users).

Descriptors: (*Thermal expansion, Solids), (*Solids, Thermal expansion), Low-temperature research, Thermodynamics, Crystallography, Dielectric properties, Metals, Glass, Diamonds, Superconductors, Theory, Experimental data.

Contents: Theory, Experimental methods, Dielectric solids, Metals, Glass and diamond-structure solids, Superconductors.

AD-611 970 Div. 25, 4

Princeton Univ., N. J.
THE CRYSTAL STRUCTURE OF 3,3,4,4-TETRAHYDRO-FURANTETROL (AN APPLICATION OF VECTOR VERIFICATION).
Revised ed.,
by Alan D. Mighell and Robert A. Jacobson. 30 Jan 64, 7p
Grant PHS GPM14776R1
AROD 3083 16

Unclassified report

Pub. in Acta Crystallographica (Denmark) v17 pt12 p1554-60 Dec 1964. (Copies available only to DDC users). Revision of 15 Jul 63.

Descriptors: (*Crystal substructure, Vector analysis), (*O-heterocyclic compounds, Crystal substructure), (*Alcohols, Crystal substructure), Crystal lattices, Symmetry (Crystallography), Anisotropy, Chemical bonds.

A three-dimensional crystal structure analysis of 3,3,4,4-tetrahydrofurantetrol determined that this molecule exists in a twisted configuration (44 ring twist), that the space group is P(4)2 sub 1c with eight molecules per unit cell, and that the molecules lie in layers which are held together and interconnected by hydrogen bonds. The trial model was obtained by a new method called

vector verification. The method systematically checks, by applying space group symmetry and other conditions, each point in a three-dimensional grid in electron density space. At each grid point, a series of vectors is computed and compared with the observed Patterson function, and only if the vectors exist in the Patterson map can the grid point be considered as a possibility for an atomic position. The trial model was refined using full matrix least squares to a final model having an agreement index of 0.11. (Author)

AD-611 981 Div. 25

Decision Sciences Lab., Bedford, Mass.
DISCRIMINATION OF SHARP SPECTRAL CHANGES WITHIN BROAD-BAND NOISES.
by Irwin Pollack. 1962, 4p
Proj. 7682
ESD TDR-63-405
Unclassified report

Pub. in Journal of Auditory Research (U. S.) v3 p165-68 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Noise, Broad-band), (*Pitch discrimination, Broadband), Intensity, Sound pitch, Acoustic filters.

The spectrum of a white noise was modified in single half-octave or octave bands by sharp m-derived filters. The intensity differential necessary for discrimination of the modified noise from a white noise was determined in listening tests. Detection of both positive and negative intensity differentials required about a 3-db differential for both half-octave and octave bands about 1000 cps. Successively larger intensity differentials were required at lower sound frequencies, especially for the discrimination of negative intensity differentials. (Author)

AD-611 995 Div. 25, 15

Rensselaer Polytechnic Inst., Troy, N. Y.
THE VIBRATIONS OF A RANDOM ELASTIC STRING: THE METHOD OF INTEGRAL EQUATIONS,
by Bruce E. Goodwin and William E. Boyce.
20 Sep 63, 6p
Grant AF AFOSR182 63 Unclassified report
AFOSR 65-0329
Pub. in Quarterly of Applied Mathematics (U.S.) v22 n3 p261-6 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Vibration, Elasticity), (*Integral equations, Vibration), (*Boundary value problems, Vibration), Statistical functions, Green's function, Rods, Correlation techniques.

The theory of Fredholm integral equations is applied to the problem of determining the natural frequencies of transverse vibrations of a tightly stretched elastic string whose mass per unit length varies with position in a stationary random manner. Upper and lower bounds for the statistical moments of the frequencies are given in terms of corresponding moments and appropriate correlation functions for the random linear density. The adequacy of the bounds decreases for the higher frequencies. Extensions to more general random boundary value problems are also indicated. (Author)

AD-611 996 Div. 25

Sloane Physics Lab., Yale Univ., New Haven, Conn.
RELAXATION RATES OF THE Ar(+) LASER LEVELS,
by W. R. Bennett, Jr., P. J. Kindlmann, G. N. Mercer, and J. Sunderland. 28 Jul 64, 4p
Grant AFOSR626 64
AFOSR 65-0112
Unclassified report

Pub. in Applied Physics Letters (U. S.) v5 n8 p158-60 Oct 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Oscillation), (*Electron transitions, Relaxation time), (*Relaxation time, Electron transitions), (*Argon, Ions), Excitation, Ground state, Selection rules, Atomic spectroscopy, Atomic energy levels, Pressure.

AD-612 001 Div. 25

General Atomic Div., General Dynamics Corp., San Diego, Calif.
ELECTRON-AND PHOTON-IMPACT IONIZATION OF 02,
by J. William McGowan, E. M. Clarke, Harold P. Hanson, and R. F. Stebbings. 21 Sep 64, 3p
Contracts Nonr278600, DA49 146XZ041
Unclassified report

Pub. in Physical Review Letters (U. S.) v13 n21 pT526 1-3 Nov 23 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ionization, Oxygen), (*Electrons, Ionization), (*Photons, Ionization), Ionization potential, Diatomic molecules, Excitation, Electron transitions, Molecular beams, Dioxides, Gas ionization.

AD-612 009 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif. Div. of Engineering Mechanics.
STRESS STRAIN RELATIONS FOR STRAIN RATE SENSITIVE ELASTIC PLASTIC MATERIALS.
Rept. no. 1,
by J. M. Kelly. Feb 65, 37p Technical rept. no. TR-152
Contract DA04 200AMC659R
Unclassified report

Descriptors: (*Materials, Mechanical properties), (*Strain (Mechanics), Theory), (*Stresses, Theory), Elasticity, Plasticity, Viscosity, Viscoelasticity, Creep, Propagation, Mathematical analysis, Mechanical waves, Equations.

Extensions of the Sokolovsky (Prikl. Mat. Mekh. 12:261-280 (1948))-Malvern (Jour. of Appl. Mech. 18:203-208 (1957)) theory of strain rate dependent plasticity are proposed. These extensions are based on concepts of strain dependent viscosity and of hereditary integral viscosity, and are based on both the linearly viscoplastic constitutive equation and on the exponentially viscoplastic one. The basic tests, creep, relaxation and constant strain rate, are examined and the application of the theories to wave propagation is discussed. (Author)

AD-612 012 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

United Aircraft Corp., East Hartford, Conn. Research Labs.
RESEARCH PROGRAM ON NEW PEROVSKITE LASER HOST MATERIALS OF THE A(B sub 0.5B sub 0.5) 03-TYPE HAVING CUBIC CENTROSYMMETRIC LATTICE SITES.

Semiannual rept. for 1 Aug 64-31 Jan 65,
by F. S. Galasso, G. K. Layden, and D. E. Flinchbaugh.
26 Feb 65, 79p Rept. no. UACRL-D910269-3
Contract Nonr460600, ARPA Order 306.
Unclassified report

Descriptors: (*Lasers, Single crystals), (*Fluorescence, Single crystals), Barium compounds, Oxides, Lanthanum compounds, Yttrium compounds, Boron compounds, Tantalum compounds, Lutetium compounds, Scandium compounds, Indium compounds, Gadolinium compounds, Impurities, Chromium, Neodymium, Crystal growth, Crystal structure, X-ray diffraction analysis.

Research is directed toward obtaining laser host materials with structures having cubic centrosymmetric sites in which trivalent laser activating ions can be substituted. Powders of perovskite-type compounds having the general formula Ba(B(3+) sub 0.5Ta sub 0.5) 03 with B(3+) = rare earth Y(3+), Sc(3+) and In(3+) ions were prepared and their structures analyzed by means of X-ray diffraction. The studies showed that the most suitable host materials for this program were Ba(Y sub 0.5Ta sub 0.5)03, Ba(Lu sub 0.5Ta sub 0.5)03, Ba(Sc sub 0.5Ta sub 0.5)03 and Ba(In sub 0.5a sub 0.5)03 because they had cubic unit cells and contained ions with appropriate electronic configurations. These compounds have been prepared with Cr(3+) and Nd(3+) doping, and the fluorescence spectra of the Nd(3+) doped phases have been recorded and analyzed. Studies involving flux growth of crystals also have been made during this period.

AD-612 017 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
THE MEASUREMENT OF ENERGY TRANSFER IN GAS-SOLID SURFACE INTERACTIONS USING ELECTRON BEAM EXCITED EMISSION OF LIGHT,
by D. J. Marsden. Nov 64, 85p
Rept. no. UTIAS-101
Grant AF AFOSR276 64
AFOSR 64-2482
Unclassified report

Descriptors: (*Transport properties, Gases), (*Gases, Metals), (*Electron beams, Excitation), Heat transfer, Energy, Surface properties, Kinetic theory, Electron guns, Electroluminescence, Density, Nitrogen, Silver, Thermal conductivity, Vacuum, Rotation, Thermodynamics.

A new approach is described to the measurement of energy accommodation of a rarefied gas at a solid surface. Gas molecules from a surrounding gas in thermal equilibrium and at rest are incident on a cooled metal target disc. Under conditions of free-molecule-flow the incident molecules are not disturbed by the cooler reflected molecules. A high energy electron beam is passed through the gas in front of the target disc and parallel to it, exciting the gas to electroluminescence. The rotational energy distribution and number density of molecules can be determined from a spectrographic analysis of the light emitted by the gas. The contribution to the measured intensity of spectrum lines due to the incident molecules can be determined with the target retracted, and then subtracted from total light intensity measurements made with the target in position in order to get the rotational energy distribution and number density of the reflected molecules alone. Measurements made with nitrogen on a silver target showed that the translational and rotational degrees of freedom both had an accommodation coefficient alpha = 0.85, and that the rotational energy distribution of the reflected molecules corresponded to that of gas in thermal equilibrium.

AD-612 046 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Northwestern Univ., Evanston, Ill.
ELECTRICAL AND OPTICAL PROPERTIES OF GRAY TIN.
Final rept. for Sep 54-Nov 64,
by A. W. Ewald. Feb 65, 10p
Contracts Nonr122806, Nonr122829 Unclassified report

Research supported in part by the Advanced Research Projects Agency, Washington, D. C.

Descriptors: (*Tin, Semiconductors), (*Semiconductors, Tin), Electrical properties, Optical properties, Filaments, Single crystals, Transport properties, Atomic energy levels, Electron transitions, Magnetic properties, Impurities, Aluminum, Indium, Zinc, Low-temperature research, Graphite.

Extensive measurements of conductivity, magnetoresistance, Hall effect and thermoelectric power were made of polycrystalline filaments in the temperature range from 77 to 273K. The results, in general, tended to confirm the view that gray tin was a semiconductor of small, but finite, band gap. Discovery of a method of growing single crystals permitted useful measurements of the optical reflectivity. The single crystals made possible the investigation of the dependence of transport properties on crystal orientation. Magnetoresistance measurements as function of crystal orientation together with subsequent measurements of the oscillatory component of the low temperature magnetoresistance, provided experimental evidence basic to the currently accepted band structure model. The most remarkable feature of this model is the zero gap between the lowest conduction band edge and the uppermost valence band. The measured 0.08eV energy separation, originally believed to be the band gap, is, in fact, the separation between the lowest and secondary minima of the conduction band. According to the new model, gray tin occupies a unique position between the typical semiconductors (finite band gaps) and the semimetals in which the bands overlap.

AD-612 051 Div. 25, 8
CFSTI Prices: HC$1.00 MF$0.50

Tyco Labs., Waltham, Mass.
STUDY OF SURFACE STATES IN SEMICONDUCTORS.
Interim rept. for 5 Jul-4 Sep 64,
by G. Rupprecht and P. H. Smakula. Feb 65, 24p
Contract AF30 602 3157, Proj. 5519, Task 551906
RADC TDR-64-485
Unclassified report

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Descriptors: (*Semiconductors, Surface properties), (*Surface properties, Semiconductors), Density, Silicon alloys, Hall effect, Electrical properties, Oxides, Coatings, Thickness, Phosphorescent materials.

Silicon surfaces were studied, using the pulsed field effect, which were prepared by three means: untreated, thermal oxide grown in air (no H2O), and anodically oxidized, the oxide being grown to various thicknesses. On 10 omega-cm n-type silicon, samples oxidized to less than 500 A showed a surface state 0.54 eV below the conduction band. Oxide thicknesses greater than this showed a resulting state 0.64 eV below the conduction band. At the same time, the capture cross section increased with oxide thickness. Preliminary results indicate that the density of surface states is inversely proportional to the dislocation density. (Author)

AD-612 052 Div. 25, 4
CFSTI Prices: HC$5.00 MF$1.25

Colorado Univ., Boulder.
EXPERIMENTAL PROGRAM TO DETERMINE THE THERMODYNAMIC PROPERTIES OF SOLUTIONS OF LIQUEFIED LIGHT GASES.
Rept. for Apr 62-Oct 64,
by Paul L. Barrick and Richard N. Herring.
Oct 64, 186p
Contract AF33 657 8512, Proj. 7360, Task 736001
ML TDR-64-321
Unclassified report

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Descriptors: (*Thermodynamics, Liquefied gases), (*Liquefied gases, Solutions), Cryogenics, Heat transfer, Gas analysis, Heat of solution, Helium, Oxygen, Mixtures, Phase studies, Test equipment.

An experimental investigation was conducted to measure the gas-liquid solubilities for the helium-oxygen system at equilibrium conditions. The apparatus used was based on the vapor recirculation method of effecting equilibria and was constructed to operate at low temperatures and moderate pressures. Environmental conditions for the equilibrium cell were provided in a dewar-type cryostat with instrumentation for accurate temperature and pressure control in addition to the required communications for normal operation of an equilibrium apparatus. The system was studied in the temperature range 70K to 150K and at pressures up to 200 atmospheres with the data being obtained in isothermal form at 70, 76, 90, 110, 130, 144, and 150K. A thermodynamic analysis was made on the data to evaluate both the accuracy and self-consistency of the isotherms. Methods based on the Gibbs-Duhem equation and regular solution theory were used in addition to a molecular physics based theory for extracting Henry's law constants, heats of solution, and partial molar volumes.

AD-612 078 Div. 25, 13, 17
CFSTI Prices: HC$3.00 MF$0.75

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
SECOND ORDER EFFECTS IN DISSIPATIVE SOLIDS,
by Maria Ronay and A. M. Freudenthal. Jan 65,
95p Technical rept. no. TR-13
Contract Nonr26691, Proj. NR064 470
Unclassified report

Descriptors: (*Strain (Mechanics), Solids), (*Solids, Strain (Mechanics)), Deformation, Elasticity, Viscosity, Plasticity, Shear stresses, Loading (Mechanics), Torque, Tensor analysis, Aluminum, Iron, Rubber, Hardening.

Non-linearity of the strain-displacement equations (geometric non-linearity) or non-linearity of the constitutive tensor relations (tensorial non-linearity) or a combination of both produces phenomena that do not appear in the classical theories, such as density changes under imposed shear ('dilatency' or 'Kelvin effect') and extensions or normal stresses accompanying torsion (Poynting effect' or Weissenberg effect'). Theories of such second-order effects are discussed. The accumulation of second-order strain ('strain hardening') or the irreversibility of deformation, and interaction of second-order extension with axial loads are considered.

AD-612 082 Div. 25, 30

Pennsylvania State Univ., University Park. Dept. of Engineering Mechanics.
COMPUTER-ANALYSIS METHODS FOR STRESS WAVES AND SPHERICAL CAVITIES.
Final technical rept.,
by Norman Davids and Pravin Mehta. 30 Nov 64, 95p
Contract DA36 034ORD3576RD
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Mechanical waves, Analysis), (*Cavitation, Analysis), Elasticity, Plasticity, Stresses, Spheres, Rods, Propagation, Computers, Simulation, Programming languages, Stability.

Contents:
Introduction-computer analysis in general
Elastic waves in long bars and fundamentals
Plastic waves in long bars
Spherical elastic waves
Spherical elasto-plastic waves
Spherical plastic rigid (or bulk) waves
Expansion of a spherical cavity-quasi-static theory.

AD-612 086 Div. 25, 9
CFSTI Prices: HC$1.00 MF$0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
INTERNAL ANGULAR MOMENTUM AND INTERNAL ENERGY OF FLUIDS,
by F. E. Bisshopp. Jan 65, 23p
Technical rept. no. TR-60
Contract Nonr562 07, Proj. NR062 179
Unclassified report

Descriptors: (*Kinetic theory, Fluids), (*Fluid dynamic properties, Continuum mechanics), (*Thermodynamics, Fluid dynamic properties), Molecules, Momentum, Energy, Rotation, Fluid mechanics, Differential equations, Tensor analysis.

A refinement of the usual equations of fluid dynamics applicable to fluids whose internal, rotational degrees of freedom provide observable effects is here developed. The formulation proceeds along the lines of classical continuum mechanics and thermodynamics. (Author)

AD-612 087 Div. 25, 17
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif. Dept. of Materials Science.
SOME ASPECTS OF SOLUTE SEGREGATION TO STACKING FAULTS,
by M. L. Rudee and R. A. Huggins. Feb 65, 33p
Rept. nos. SU-DMS-657, TR-13
Contract Nonr225 34, Proj. NR031 577
Unclassified report

See also AD-609 000.

Descriptors: (*Crystal lattice defects, Alloys), Metallography, Copper alloys, Zinc alloys, Heat treatment, Brass, Resistance (Electrical), X-ray diffraction analysis.

Although the possibility of segregation of substitutional atoms to stacking faults has been discussed by a number of authors, experimental confirmation is quite contradictory. To clarify this point, a series of isothermal annealing

measurements of a substitutional FCC alloy was performed to investigate the existence and kinetics of segregation. During the first hour of room temperature annealing of filings of a Cu plus 22.8 atomic % Zn alloy, the width of stacking faults increases. This increase is produced by segregation to the faults. Subsequently, after annealing for about one day, a decrease in the width of the faults occurs. The origin of this decrease in width remains unknown. By correlation of the amount of faulting present and the electrical resistivity, the following observations about the resistivity of stacking faults in this system can be made: (A) Prior to the drop in the width of the faults, the fault contributes about twenty per cent of the resistivity per unit length of dislocation ribbon. (B) The specific resistivity of the fault is 1.1 x 10 to the minus 12th power eta ohm-sq cm, where eta is the number of faults per unit distance. (Author)

AD-612 089 Div. 25, 4
CFSTI Prices: HC$1.00 MF$0.50

Weizmann Inst. of Science, Rehovoth (Israel).
INTERPRETATION OF SPECTRA OF HC1 AND DC1 IN AN ARGON MATRIX.
Technical (Scientific) Note no. 12,
by H. Friedmann and S. Kimel. Dec 64, 7p
Contract AF61 052 388
AFCRL 65-107

Unclassified report

Descriptors: (*Hydrochloric acid, Molecular spectroscopy), (*Deuterated compounds, Chlorides), (*Argon, Hydrochloric acid), (*Molecular spectroscopy, Gases), Crystals, Line spectrum, Quantum mechanics, Hamiltonian, Molecular rotation, Perturbation theory, Israel.

A novel treatment to interpret the spectra of HC1 and DC1 trapped in solid argon is presented in which the J-dependent shifts of the lines result from the 'translation-rotation coupling' effect. (Author)

AD-612 090 Div. 25, 20
CFSTI Prices: HC$2.00 MF$0.50

Ecole Normale Superieure, Paris (France).
RADIATION DAMAGE IN SEMICONDUCTORS.
Annual summary rept. no. 3, Jul 63-Jul 64,
by P. Baruch. 10 Oct 64, 29p
Contract AF61 052 543
AFCRL 65-31

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-433 042.

Descriptors: (*Semiconductors, Radiation damage), (*Radiation damage, Semiconductors), Crystal lattice defects, Silicon, Diffusion, France, Heat of activation, Impurities, High-temperature research, Cryogenics, Thermal properties, Optical properties, Electrical properties, Electron bombardment, Proton bombardment.

This report describes studies in the following areas: (1) Defect mobility in irradiated semiconductors: 3 stages of annealing are observed in Silicon between OC and 120C, with different defect mobilities. (2) Radiation enhanced diffusion in silicon: new experimental results lead to a model of defect diffusion with trapping at impurities (3) Low temperature irradiation of semiconductors: thermal, optical and electrical measurements are being prepared. (Author)

AD-612 093 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
OPTIMIZATION OF THE BACK-TO-FRONT SUPPRESSION AND FREQUENCY BANDWIDTH RELATIONSHIP FOR THREE-DIMENSIONAL ACOUSTIC ARRAYS.
Interim rept.,
by M. A. Blizard. 12 Feb 65, 21p Rept. no. NRL-6204
Proj. RF001 03 44 4052

Unclassified report

Descriptors: (*Acoustic equipment, Sound transmission), (*Sound transmission, Optimization), Bandwidth, Propagation, Mathematical analysis, Performance (Engineering).

For those three-dimensional arrays whose radiation-pattern function is the product of an end-fire-array-pattern function and a broadside-array-pattern function, a procedure has been developed for optimizing the frequency range vs the back-to-front-suppression relationship. That is, the amplitude coefficient distribution for the array is determined by a Tchebyscheff polynomial technique so that (a) the back-to-front suppression is maximum over a predetermined frequency range or (b) a specified back-to-front suppression is available over a maximum frequency range. (Author)

AD-612 094 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
MICROACOUSTIC SYSTEM ANALYSIS BY THE MEASUREMENT OF FREE-FIELD SOUND SPEED.
Interim rept.,
by W. G. Neubauer and L. R. Dragonette. 3 Aug 64,
12p Rept. no. NRL-6113
Proj. RF001 03 45 5252

Unclassified report

Descriptors: (*Underwater sound, Sound transmission), (*Sound transmission, Measurement), (*Velocity, Underwater sound), Transducers, Acoustic equipment, Underwater sound equipment, Temperature, Scattering.

An analysis of the microacoustic system was undertaken by means of the measurement of free-field sound speed in water. The water was contained in a 10x5x5 ft cypress tank. A pulse was transmitted from a fixed source to a receiver which was positioned at two different distances along a radius of the source. The distance difference of approximately one meter and the travel time over this distance were accurately measured. Sound-speed measurements were taken at 41 temperatures over a range from 16.8 to 23.10C. A 290-degree spherical cap was used as the fixed source. The movable receiver was a disk transducer whose active element radius was 0.16 lamda at the source resonant frequency of approximately 200 kc. Measurements were also obtained by using 0.63-cm radius disks as source and receiver with the same results. The experimental measurements led to the detection of a large error which exists in the remote determination of large distances using a cathetometer mounted horizontally. This error was eliminated and evaluated by moving along an accurately calibrated bar, allowing distance to be measured directly. Subsequently, a new system was designed which will allow the remote determination of distances accurate to within ±0.001 cm. It was found that the ambient temperature at a given depth in the tank remained constant to within ±0.01C. for a time sufficient to make the required measurements and that vertical temperature gradients were not present to a significant degree. The free-field value of velocity was determined to be at least 0.2 to 0.6 m/sec lower than

confined field values measured by others. (Author)

AD-612 096 Div. 25, 7, 12, 17
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
HIGH TEMPERATURE PROPERTIES OF SODIUM, POTASSIUM, AND CESIUM.
Progress rept. no. 13, 1 Oct-31 Dec 63,
by J. P. Stone, C. T. Ewing, J. R. Spann, and R. R. Miller. 15 Jan 65, 7p Rept. no. NRL-6213
Contract NAS C76320

Unclassified report

See also AD-602 243.

Descriptors: (*Sodium, Thermodynamics), (*Potassium, Thermodynamics), (*Cesium, Thermodynamics), (*Thermodynamics, Alkali metals), (*Liquid metals, Electric power production), High-temperature research, Vapors, Vapor pressure, Density, Equations of state, Experimental data.

An experimental program to measure various thermophysical properties of sodium, potassium, cesium and their vapors at elevated temperatures has been completed at NRL. Preliminary data for the density of liquid potassium (1099 to 2287F) and the vapor pressure of cesium (1214 to 2345F) are presented in this report. (Author)

AD-612 100 Div. 25, 31
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
THE EFFECT OF INITIAL IMPERFECTIONS ON THE COLLAPSE STRENGTH OF DEEP SPHERICAL SHELLS,
by Martin A. Krenzke and Thomas J. Kiernan. Feb 65, 40p Rept. no. 1757
Proj. S R011 01 01

Unclassified report

Descriptors: (*Structural shells, Failure (Mechanics)), (*Spheres, Structural shells), Tensile properties, Tolerances (Mechanics), Loading (Mechanics), Buckling (Mechanics), Hydrostatic pressure, Underwater objects, Pressure vessels, Mathematical analysis, Quality control, Model tests, Elasticity.

An analysis is developed to account for the effects of imperfections on the collapse strength of spherical shells. The analysis is empirical but is based on an engineering evaluation of recent tests of near-perfect deep spherical shells and spherical caps. Sixty-two models were machined with local thin spots and flat spots and subjected to external hydrostatic pressure. The analysis is in good agreement with experimental results despite the severity of imperfections selected to test the analysis. The limitations of the analysis are discussed and curves showing the relationship between out of roundness and local radius are presented to aid the design engineer in establishing acceptable tolerance limits for fabrication of spherical shells. (Author)

AD-612 107 Div. 25, 15
CFSTI Prices: HC$3.00 MF$0.75

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
PLANE WAVES IN AN ELASTIC-PLASTIC HALF-SPACE DUE TO COMBINED SURFACE PRESSURE AND SHEAR,
by Hans H. Bleich and Ivan Nelson. Jan 65, 74p
Technical rept. no. TR-36, CU-1-65-ONR-266(86)-CE
Contract Nonr26686, Proj. NR064 428

Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Loading (Mechanics), Boundary value problems), (*Continuum mechanics, Mechanical waves), Shear stresses, Stresses, Pressure, Surfaces, Plasticity, Elasticity, Differential equations, Integrals.

The most general case of plane wave propagation, when normal and shear stresses occur simultaneously, is considered in a material obeying the v. Mises yield condition. The resulting non-linear differential equations have not previously been solved for any boundary value problem, except for special situations where the differential equations degenerate into linear ones. In the present paper, the stresses in a half-space, due to a uniformly distributed step load of pressure and shear on the surface, are obtained in closed form. (Author)

AD-612 112 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
RUBY LASER WITH VIBRATING REFLECTOR,
by E. A. Gerber and E. R. Ahlstrom. 1964, 16p

Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Lasers, Ruby), (*Ruby, Lasers), (*Reflectors, Lasers), Solid state physics, Crystals, Excitation, Pumping (Electronics), Flash lamps, Dielectrics, Mirrows, Quartz, Electromagnetic waves, Intensity, Army research, Symposia.

It was thought that an effect similar to that caused by the traveling wave laser may be obtained if at least one reflector of the Fabry-Perot cavity is vibrated with sufficient amplitude and frequency. This measure could at least partially smear out a nonuniform distribution of excited states. To prove this out, experiments were performed with a ruby laser with detached reflectors. One reflector was a stationary dielectric mirror with a reflectivity of 0.99, the other reflector provided the frequency sweeping mechanism: it consisted of an X-cut quartz vibrator. It was held at its circumference at three points and its silver coating served as electrode and mirror, with a reflectivity of 0.95. Vibrators with a resonance frequency of 1, 2, or 3 mc were used. They had a diameter of 38 mm and were driven in a thickness extensional mode of vibration. A solar cell with a parallel resistor to increase its frequency range, in combination with an oscilloscope, was used to record the power output of the laser. The total energy output of the laser was measured by observing the loss of charge of a capacitor through a phototube illuminated by the laser beam. (Author)

AD-612 118 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
THE USE OF INTENSE PINCH DISCHARGES FOR LASER ILLUMINATION,
by R. G. Buser, J. J. Kainz, and J. J. Sullivan. 1964, 15p

Unclassified report

Also included in Proceedings of the 1964 Army

Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 1964, Volume I, AD-611 432.

Descriptors: (*Lasers, Pumping (Electronics)), (*Pumping (Electronics), Gas discharges), (*Gas discharges, Pumping (Electronics)), Magnetic pinch, Plasma physics, Ruby, Excitation, Gases, Electrical equipment, Light, Intensity, Army research, Symposia.

Results so far indicate a) Pinch discharge light sources provide excellent means for laser pumping with increased efficiency in comparison to conventional light sources in particular in the spectral range below 5000A. b) For the first time high repetition rates are feasible which are necessary for certain military applications. The fast pinch discharge mechanism also may eliminate the need for mechanical or electronic Q - spoiling and simplifies the system. *c) For each laser material the light source should be tailored for optimum performance. It might also be possible to develop new laser materials matching the particular properties of pinch discharges. For example, intense radiation in the ultraviolet is expected at high degrees of ionization. Therefore new laser materials with absorption bands in the UV become promising. (Author)

AD-612 124 Div. 25, 7
CFSTI Prices: HC$1.00 MF$0.50

Plasma Lab., Univ. of Arkansas, Fayetteville.
RESEARCH ON THE INTERACTIONS OF PLASMA FLOW AND MAGNETIC FIELDS,
Quarterly progress rept. for 15 May-15 Aug 64.
15 Aug 64, 16p Rept. no. UAPL-19
Contract DA23 072AMC168Z

Unclassified report

See also AD-447 800.

Descriptors: (*Plasma jets, Magnetic fields), (*Magnetohydrodynamics, Generators), (*Energy conversion, Magnetohydrodynamics), Plasma medium, Inductance, Electrical conductance, Gas discharges, Velocity, Heat transfer, Electrodes, Cooling, Reentry vehicles, Power supplies.

Topics include: status of equipment; theoretical studies of plasma interaction with a magnetic field; theoretical and experimental studies of plasma electrical conductivity; jet velocity measurements; heat transfer measurements; wear-out of electrodes; evaluation of AC magnetohydrodynamic generator for re-entry.

AD-612 127 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

California Univ., Berkeley.
CYCLOTRON RESONANCE IN SOLIDS.
Final rept. for May 59-May 62,
by Arthur F. Kip. 27 May 62, 4p
Contract AF49 638 600
AFOSR 2765

Unclassified report

Research continued under Grant AF AFOSR62 27.

Descriptors: (*Cyclotron resonance phenomena, Solids), (*Metals, Cyclotron resonance phenomena), Surfaces, Atomic orbitals, Microwaves, Magnetic fields.

The report contains a short summary of scientific work accomplished, a list of papers published and in preparation, a statement of equipment and facilities developed, and a listing of graduate students involved in the program, with a listing of degrees granted. (Author)

AD-612 132 Div. 25, 8
CFSTI Prices: HC$1.00 MF$0.50

Institute for the Study of Metals, Univ. of Chicago, Ill.
ELECTRONIC PROPERTIES OF SEMICONDUCTORS AT LIQUID HELIUM TEMPERATURES.
Final technical rept.,
by H. Fritzsche. Feb 65, 10p
Grant AF AFOSR62 178
AFOSR 65-0435

Unclassified report

Descriptors: (*Semiconductors, Low-temperature research), (*Electrical properties, Semiconductors), Impurties, Reports, Cryogenics, Germanium, Silicon, Research program administration.

The research effort was devoted to the three least studied and least understood transport phenomena in semiconductors at low temperatures which involve the interaction of impurities. These are: (a) impurity conduction, (b) the transition from nonmetallic to the metallic state, and (c) the so-called metallic state of degenerate semiconductors. This work tries to illuminate the detailed physical phenomena which are so important for the increasing number of low temperature solid state devices such as tunnel diodes and junction lasers.

AD-612 152 Div. 25, 9, 12
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DECAY OF ELECTRON DENSITY IN THE WAKES OF HYPERVELOCITY SPHERES.
Technical rept.,
by W. M. Kornegay. 23 Dec 64, 19p Rept. no. TR-370
Contract AF19 628 500, ARPA Order 600
ESD TDR-64-592

Unclassified report

Descriptors: (*Hypervelocity projectiles, Wake), (*Wake, Plasma medium), (*Plasma medium, Recombination reactions), Spheres, Aluminum, Copper, Ablation, Sabot projectiles, Atmosphere entry, Reentry vehicles, Gas guns, Pyrolysis, Nitrogen, Time, Air.

The electron line density in the wakes of hypervelocity aluminum and copper spheres traveling 18,000 to 21,000 feet per second was measured as a function of time, by means of a transmission resonant cavity. The ambient pressure was varied over the range of 10 to 160 torrs to determine its influence on the electron density decay. Typical results are given for measurements of the electron density in air and in nitrogen. A significant electron density was found to persist in nitrogen trails for long times, because the electron-ion recombination reaction is the only important electron removal process. In air, electron attachment becomes the predominant process for electron decay, after an initial period when electron-ion recombination controls the decay. Results on the effect of ablated aluminum and sabot material on the electron density decay are given. Electron decay data which can be repeated from shot to shot, without large discrepancies, are shown to be obtainable under carefully controlled experimental conditions. (Author)

AD-612 157 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Illinois Univ., Urbana. Dept. of Physics.
MICRODYNAMICS OF PLASTIC FLOW AT CONSTANT STRESS,
by J. J. Gilman. Feb 65, 27p
Technical rept. no. TR-1
Contract Nonr398506

Unclassified report

Descriptors: (*Creep, Dynamics), (*Dynamics, Creep), Stresses, Crystal lattice defects, Strain (Mechanics), Solids, Differential equations, Mathematical analysis.

Arguments are presented which conclude that the mean density of mobile dislocations in a crystalline solid increases linearly with plastic strain for small strains and decays exponentially for large strains, all at constant stress and low temperatures. The resulting analytic expression combined with the strain-rate equation can be integrated explicitly in terms of tabulated exponential integral functions. This creep equation has a general form that is consistent with many experiments and detailed comparison with a particularly well-documented experimental curve yields quantitative agreement. The large strain limit of the proposed creep equation is the familiar logarithmic creep law. A simple transformation of the creep equation yields the shape of a slowly propagating plastic-front, and it is shown that the predicted shape corresponds to experimental observations for mild steel. The lengths of the incubation periods that precede fast flow, as predicted by the equation, have a stress dependence that agrees with experiment. Finally, the present arguments together with previous ones yield a strain-rate equation which generates both stress-strain and strain-time curves that are good reproductions of experimental observations. (Author)

AD-612 160 Div. 25, 17
CFSTI Prices: HC$1.00 MF$0.50

Watervliet Arsenal, N. Y.
THE RECOVERY OF THE ULTRASONIC ATTENUATION IN COPPER SINGLE CRYSTALS FOLLOWING SMALL PLASTIC DEFORMATION,
by Julius Frankel. 1962, 17p

Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Copper, Single crystals), (*Ultrasonic radiation, Single crystals), (*Single crystals, Ultrasonic radiation), (*Deformation, Copper), Heat of activation, Attenuation, Stresses, Elasticity, Crystal lattice defects, Mathematical analysis.

When a metal undergoes small plastic deformation, there is a change in its apparent Young's Modulus and internal friction. Both of these quantities recover following the deformation. This experiment was made to study the decrease of ultrasonic attenuation in copper single crystals following small plastic deformation. The change in the attenuation of an ultrasonic wave in a stressed single crystal does not take place smoothly. This work indicates that more than one recovery process is involved, and that the most clearly measured process has an activation energy of 1.5ev.

AD-612 177 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Minnesota Univ., Minneapolis. Dept. of Electrical Engineering.
FIELD PATTERNS IN A RUBY LASER,
by R. J. Collins and A. Hordvik. 1964, 56p
Technical rept. no. TR-1
Contract Nonr71061, Task NR015 704

Unclassified report

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Descriptors: (*Lasers, Optical properties), Ruby, Rods, Oscillation, Diffraction, Polarization.

A discussion is first given of the offaxis modes and of the mode selection mechanism. Experimentally it is then shown that radiation did appear at discrete angles with the axis, but some modes that were expected to be seen were not observed. Diffraction patterns were found and they are explained as Fabry-Perot or Fraunhofer patterns. Surface patterns were investigated, and there seemed to be a close connection between the asymmetric distribution of the active region and the occurrence of off-axis modes. The axial and off-axis modes were found to be polarized in the same plane within experimental error. Threshold and delay times were investigated, and good agreement was found between observed data and approximated theoretical calculations. Finally it was found that the intensity of the axial modes increases at a slower rate with input energy when the off-axis modes start occurring. A qualitative explanation is given for this. (Author)

AD-612 179 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Yale Univ., New Haven, Conn.
DENSITY MEASUREMENTS IN SOLID HE4,
by J. N. Kidder. 1962, 10p
Contract AF49 638 690
AFOSR 2864

Unclassified report

Descriptors: (*Solidified gases, Helium), (*Helium, Solidified gases), (*Cryogenics, Helium), Measurement, Density, Test methods, Thermal expansion, Volume, Phase studies, Pressure, Transition temperature.

The measurements were made on solid He4 in the region of the gamma (body-centered cubic) phase discovered by Vignos and Fairbank. Points were taken at constant temperature for six temperatures between 1.45K and 1.73K. The results for pressures near the melting and transition curves are shown. The lower density gamma phase is clearly seen as the first step in the curve. The measured volume changes for melting and for the solid transition are listed. The volume changes for melting agree with those of Grilly and Mills to within 2-3%, while the solid transition volume changes are slightly higher than theirs but in agreement within the experimental error. Their data indicated a minimum in the solid transition volume change near the center of the gamma phase. No such effect is seen here.

AD-612 209 Div. 25, 4

Washington Univ., Seattle.
RADIOFREQUENCY RESONANCE ORIENTATION,
by H. G. Dehmelt. 1964, 1p
Technical rept. no. TR-12
Grant DA ARO D31 124G418, Proj. 1816P
AROD 4091-1

Unclassified report

Pub. in American Physical Society. Bulletin (U. S.) v9 p626 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radiofrequency spectroscopy, Helium), (*Helium, Radiofrequency spectroscopy), Atomic energy levels, Line spectrum, Resonance, Electron transitions, Ions.

AD-612 211 Div. 25, 2, 15

Seismological Lab., Calif. Inst. of Tech., Pasadena.
DIFFRACTION OF VECTOR ELASTIC WAVES BY A CLAMPED FINITE STRIP,
by D. D. Ang and L. Knopoff. 11 May 64, 7p
Grant AF AFOSR26 63

Unclassified report

Pub. in National Academy of Sciences. Proceedings (U. S.) v52 n2 p201-7 Aug 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mechanical waves, Diffraction), (*Diffraction, Mechanical waves), Elasticity, Sheets, Boundary value problems, Differential equations, Integration, Complex variables, Fracture (Mechanics), Seismic waves.

AD-612 218 Div. 25

National Bureau of Standards, Washington, D. C.
SPECTRAL STUDY OF ACTIVE NITROGEN FLAMES EXHIBITING CN 'TAIL' BANDS,
by Robert L. Brown and H. P. Broida. 12 May 64, 8p

Unclassified report

Pub. in Journal of Chemical Physics (U. S.) v41 n7 p2053-60 Oct 1 1964 (Copies not available to DDC or Clearinghouse customers)
Prepared in cooperation with California Univ., Santa Barbara, Contract Nonr422201.

Descriptors: (*Carbon compounds, Band spectrum), (*Nitrogen compounds, Band spectrum), (*Nitrogen, Flames), Spectroscopy, Chloroform, Carbon tetrachloride, Halogenated hydrocarbons, Chlorine compounds.

Flames of active nitrogen and simple chlorinated hydrocarbons which exhibit several zones defined by differences in intensity and spectra have been examined under a variety of conditions of flow rate, pressure, added impurities, and burner configuration. One of these zones exhibited strong emission arising from the CN 'tail' bands, i.e., bands originating in high vibrational levels of the B squared sigma state. Qualitative spectra evidence is consistent with the assumption that the chemical processes responsible for the emission from the different zones all produce CN selectively in the A squared pi state but with different vibrational distributions, and that population of B squared sigma occurs through interaction of mutually perturbing rotational levels of A squared pi and B squared sigma and through collision-induced transfer from unperturbed levels in A squared pi. As an incidental aspect of the work it has been found that traces of air in the N supply were helpful for production of the 'pink' nitrogen afterglow. (Author)

AD-612 220 Div. 25

California Univ., Los Angeles.
THE ORIGIN OF LIGHT EMISSION IN THE ATOMIC HYDROGEN, ACETYLENE FLAME,
by K. D. Bayes and R. E. W. Jansson. 3 Mar 64, 8p
Grant AF AFOSR62 62
AFOSR 65-0376

Unclassified report

Pub. in Royal Society of London. Proceedings. Series A. Mathematical and Physical Sciences (Gt. Brit.) v282 p275-82 1964 (Copies available only to DDC users).

Descriptors: (*Light, Emissivity), (*Hydrogen, Flames), (*Aliphatic compounds, Flames), Spectroscopy, Atoms, Recombination reactions, Water, Oxygen, Luminescence.

Acetylene catalyzes the gas phase recombination of hydrogen atoms, and frequently the reaction is accompanied by a bright flame. It is shown that the light emission is not the result of the catalytic recombination, but is caused by traces of water in the hydrogen. The possible reactive intermediates, OH, HO2 and atomic oxygen, have been individually generated and added to the mixture of hydrogen atoms and acetylene. Only oxygen atoms are effective in causing luminescence. Hydrogen atoms are not necessary for light emission, but they do alter the spectrum somewhat. Two different mechanisms for the formation of electronically excited C2 are required. The mechanism for the reaction of atomic oxygen with acetylene is discussed. (Author)

AD-612 224 Div. 25, 2

Microwave Lab., Stanford Univ., Calif.
ELECTRON OVERTAKING AS A CAUSE OF INSTABILITY AND TYPE III SOLAR RADIO BURSTS,
by D. E. Baldwin. 7 Sep 64, 3p Rept. no. ML-1271
Contract AF49 638 1321
AFOSR 65-0395

Unclassified report

Pub. in Physics Letters (Netherlands) v12 n3 p202-3 Oct 1 1964 (Copies available only to DDC users).

Descriptors: (*Plasma physics, Electrons), (*Electrons, Plasma physics), Stability, Electrostatics, Electron beams, Solar flares, Extraterrestrial radio waves.

It is the purpose of this note to suggest a mechanism whereby a time-dependent source of electrons in an otherwise uniform stable plasma may give rise to electrostatic instabilities even though no beam is generated by the source.

AD-612 225 Div. 25

Microwave Lab., Stanford Univ., Calif.
ADDENDUM ON INERTIAL INTERCHANGE MODES,
by B. Coppi. 7 Sep 64, 3p Rept. no. ML-1221
Contract AF49 638 1321
AFOSR 65-0394

Unclassified report

Pub. in Physics Letters (Netherlands) v12 n3 p213-4 Oct 1 1964 (Copies available only to DDC users).

Descriptors: (*Plasma physics, Electrons), (*Electrons, Plasma physics), Stability, Equations.

In a recent letter (Physics Letters, 11:226 (1964)), we considered the effects of electron inertia on plasma stability. However, because of an inconsistency in the ordering procedure, only the resistive unstable branch of the growth rates for interchange modes, as resulting from the reported dispersion relation, was regarded as significant. Here we show that the regime where the interchange instability is only governed by electron inertia can be consistently considered, and also derive a dispersion relation from which all previous results obtained in collisional or collisionless regimes can be deduced as special cases.

AD-612 226 Div. 25

Illinois Univ., Urbana.
ENERGY-BAND STRUCTURE OF SOLIDS FROM A

PERTURBATION ON THE 'EMPTY LATTICE'.
Revised ed.,
by F. Bassani and V. Celli. 14 Dec 60, 12p
Contract AF49 638 819
AFOSR 384

Unclassified report

Pub. in Physics and Chemistry of Solids (U. S.) v20 n1/2 p64-75 1961 (Copies available only to DDC users)
Revision of rept. dated 19 Sep 60.

Descriptors: (*Crystal lattices, Atomic energy levels), (*Atomic energy levels, Electron transitions), (*Perturbation theory, Crystal lattices), Solid state physics, Numerical analysis, Hamiltonian, Solids, Diamonds, Silicon, Boron compounds, Nitrides, Germanium, Gallium alloys, Arsenic alloys, Brillouin zones.

A simple perturbation approach is developed to obtain the energy-band structure of solids. The unperturbed Hamiltonian consists of the kinetic part and of a uniform potential; the perturbing operator is the crystal potential plus a term which originates from the requirement that valence and conduction states be orthogonal to the inner states. This amounts to an approximation to the O. P. W. method. Reasons are given for the validity of such a simple scheme and applications are made to the case of the diamond lattice and of the zincblende lattice. It is shown how features of the energy-band structure depend on the symmetry of the lattice, on the lattice parameter and on the 'core states' of the atomic components. Numerical results obtained for diamond, silicon and BN are in fair agreement with recent calculations. An energy-band structure consistent with experimental information is obtained for Ge and GaAs by fixing the values of a few parameters. (Author)

AD-612 229 Div. 25

Minnesota Univ., Minneapolis.
SPIN RESONANCE STUDIES OF DEFECTS IN MAGNESIUM OXIDE,
by John E. Wertz, Peteris Auzins, J. H. E. Griffiths, and John W. Orton. 20 May 59, 8p
Contract AF18 600 479
AFOSR 3588

Unclassified report

Pub. in Faraday Society. Discussions (Gt. Brit.) n28 p136-41 1959 (Copies available only to DDC users).

Descriptors: (*Crystal lattice defects, Magnesium compounds), (*Magnesium compounds, Oxides), (*Electrons, Resonance absorption), (*Molecular spectroscopy, Crystal lattice defects), Spin, Crystal structure, Hyperfine structure, Symmetry (Crystallography), Paramagnetic resonance.

Excluding impurities, trapped holes are the most important defect centres which are observable by electron-spin resonance in presently-available magnesium oxide crystals. Models are suggested for two types of trapped hole centres. The first, involving one hole, is believed to involve the following linear array: hole trapped on an oxygen atom-positive ion vacancy-normal O(-2) ion-trivalent impurity ion. The second centre, which is far less stable, involves two holes opposite one another about a positive-ion vacancy. It is suggested that another defect is associated with this pair to cause localization of the axis of symmetry. These conclusions are drawn from electron-spin resonance spectra showing simple axial symmetry for single-hole centres lying along principal crystal axes. For hole-pair centres one observes pairs of lines approximately centred upon the positions of the previously-mentioned axial lines. More complex hole centre spectra have also been observed. (Author)

AD-612 230 Div. 25

Minnesota Univ., Minneapolis.
ELECTRON TRANSFERS AMONG TRANSITION ELEMENTS IN MAGNESIUM OXIDE,
by John E. Wertz, Peteris Auzins, J. H. E. Griffiths, and J. W. Orton. 1 Jul 58, 8p
Contract AF18 600 479
AFOSR 3589

Unclassified report

Pub. in Faraday Society. Discussions (Gt. Brit.) n26 p66-71 1958(Copies available only to DDC users).

Descriptors: (*Transition elements, Transport properties), (*Magnesium compounds, Oxides), Great Britain, Solid state physics, Electrons, Electron transitions, Atomic energy levels, Crystal lattice defects, Heat treatment, Impurities, Vacuum, Oxygen, Magnesium, Vapors, X rays, Ultraviolet radiation, Nuclear magnetic resonance, Absorption spectrum, Ions, Iron, Vanadium, Chromium, Single crystals.

All single crystals of MgO which have been available contain iron-group impurities in quantities easily detectable by e.s.r. absorption. For a given impurity, the fractions in the di- and tri-valent states depend in part upon the past heat treatment and upon the concentrations of the other impurities. Energetic radiation may cause electron transfer to occur among the impurities. Oxygen of the crystal may partake in these transfers.

AD-612 234 Div. 25

Institute for the Study of Metals, Univ. of Chicago, Ill.
INTRA-AND INTERVALLEY SCATTERING AND THE TAILING OF THE CONDUCTION BAND IN IMPURE N-TYPE GERMANIUM,
by H. Fritzsche and M. Cuevas. 1962, 7p
Grant AF AFOSR62 178
AFOSR 3569

Unclassified report

Pub. in mono. (rept.) International Conference on the Physics of Semiconductors, Exeter, p29-34 Jul 1962 (Copies available only to DDC users).

Descriptors: (*Germanium, Solid state physics), (*Semiconductors, Germanium), Arsenic, Impurities, Compressive properties, Atomic energy levels, Electron transitions, Scattering, Transport properties, Work function, Conductivity, Cryogenics.

The piezoresistance of degenerate n-type germanium doped with arsenic has been measured at 1.3K using uniaxial compression along (110) and (111). The largest stress was 5 X 10 to the 9th power dyn/sq cm. The results are compared with a simple degenerate model which includes intra- and intervalley scattering but which neglects the possibility of tail states. An appreciable contribution of intervalley scattering was found. The mobility due to intravalley scattering appears to be independent of impurity concentration between 8 X 10 to the 17th power and 5 X 10 to the 18th power/cu cm. (Author)

AD-612 237 Div. 25

Michigan State Univ., East Lansing.
NUCLEAR RESONANCE AND HEAT CAPACITY STUDIES OF ANTIFERROMAGNETIC LiCuCl3.2H2O,
by R. D. Spence, H. Forstat, C. R. K. Murty, and D. R. McNeely. 1963, 2p
Contract AF49 638 613
AFOSR 3581

Unclassified report

Pub. in Physical Society of Japan. Journal, v17 supl B-I p510-11 1962 (Copies available only to DDC users).
Research supported in part by the Office of Naval Research, Washington, D. C.

Descriptors: (*Lithium compounds, Antiferromagnetism), (*Antiferromagnetism, Lithium compounds), (*Nuclear magnetic resonance, Lithium compounds), (*Specific heat, Lithium compounds), Copper compounds, Chlorides, Hydrates, Cryogenics, Crystal lattices, Entropy, Nuclear spins, Protons, Relaxation time.

The Li(7) and proton nuclear magnetic resonance in LiCuCl3.2H2O shows this compound to be antiferromagnetic below 4.46±0.02K. The local fields at the Li and H sites indicate that the magnetic symmetry group must be one of three possible types. The sublattice magnetization and spin lattice relaxation time vary more rapidly with temperature than indicated by spin wave theory. Measurements were also made on the heat capacity of LiCuCl3.2H2O, yielding a Neel temperature of 4.40±.02K. The entropy change associated with the magnetic ordering process was calculated. This change agrees within 2% of the theoretical value, Rln (2S+1) if the ground state spin of the magnetic ion is taken as 1/2. (Author)

AD-612 239 Div. 25, 15

Institute for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park.
MONOTONICITY ON CURVES IN LIEU OF THE C-N INEQUALITIES FOR FINITE ELASTICITY,
by Lincoln E. Bragg. 29 Jun 64, 12p
Contract AF49 638 541
AFOSR 65-0367

Unclassified report

Pub. in Archive for Rational Mechanics and Analysis (West Germany) v17 n4 p327-38 1964 (Copies available only to DDC users).

Descriptors: (*Elasticity, Inequalities), (*Inequalities, Elasticity), Strain (Mechanics), Energy, Functions, Tensor analysis, Stresses, Matrix algebra.

AD-612 247 Div. 25, 8, 30
CFSTI Prices: HC$3.00 MF$0.75

Oklahoma Univ., Norman.
THE PERSISTATRON UTILIZING A SUPERCONDUCTIVE GROUND PLANE.
Master's thesis,
by Charles Edward Schuster. 1965, 70p
Contract AF33 608 1096

Unclassified report

Descriptors: (*Semiconducting films, Superconductivity), (*Thin films (Storage devices), Superconductivity), (*Superconductivity, Thin films (Storage devices), (*Switching circuits, Superconductivity), Vapor plating, Photoengraving, Computer storage devices, Superconductors, Lead, Silicon compounds, Monoxides, Tin, Glass, Cryogenics, Test facilities.

The persistatron is a thin film superconductive switching device with a most probable application as a memory or computer switching element. The purpose of this work is to (1) construct by means of thin film deposition and photo mask - photo resist techniques persistatrons both with and without superconductive ground planes. (2) compare the switching characteristics by testing those devices in their superconductive state.

AD-612 249 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Oklahoma Univ., Norman.
THE EFFECT OF WALL TEMPERATURE ON THE OPERATION OF THE RIJKE TUBE.
Master's thesis,
by Quitman W. Lott. 1965, 44p
Contract AF33 608 1096

Unclassified report

Descriptors: (*Sound generators, Pipes), (*Pipes, Sound generators), (*Acoustics, Thermodynamics), (*Thermodynamics, Acoustics), Fluid flow, Surface temperatures, Test equipment, Experimental data, Graphics, Heat.

In 1859, Rijke obtained a heat-driven sound from a round tube held in a vertical position by placing a grid one-fourth of the way from the bottom of a 0.8 meter long tube and heating the grid to a red heat with a gas flame. These heat driven oscillations in the simple tube are now recognized to be caused by the same mechanism which results in various types of combustion instabilities. In their mild form these instabilities are undesirable and can become quite destructive in their more severe forms. Better known examples of these instabilities occur as rumble and afterburner screech in jet engines and in rocket engine instabilities. The purpose of this study was to construct an experimental Rijke tube apparatus and investigate the effect of the parameters, velocity, heat power, and wall temperature, with primary emphasis on wall temperature.

AD-612 250 Div. 25, 17
CFSTI Prices: HC$3.00 MF$0.75

Oklahoma Univ., Norman.
ANALYSIS OF RESIDUAL STRESS IN BARS AND TUBES WITH CIRCULAR CYLINDRICAL ORTHOTROPY.
Master's thesis,
by Wayne A. Olson. 1965, 83p
Contract AF33 608 1096

Unclassified report

Descriptors: (*Cylindrical bodies, Stresses), (*Stresses, Mathematical analysis), Elasticity, Rods, Mechanical engineering, Metals, Deformation, Graphics, Differential equations.

AD-612 275 Div. 25, 17
CFSTI Prices: HC$3.00 MF$0.75

California Inst. of Tech., Pasadena. Div. of Chemistry and Chemical Engineering.
THE STRUCTURE OF METALS AND INTERMETALLIC COMPOUNDS.
Final rept. for 1 Sep 53-31 Aug 64,
by Sten Samson. 31 Aug 64, 75p
Contract Nonr22033

Unclassified report

Descriptors: (*Metals, Crystal structure), (*Intermetallic compounds, Crystal structure), (*Crystal structure, Intermetallic compounds), Alloys, Phase studies, Silver alloys, Zinc alloys, Sodium alloys, Cadmium alloys, Magnesium alloys, Copper alloys, Aluminum alloys, Silicon alloys, Chromium alloys, Zirconium alloys, Nickel alloys.

The results obtained from the structure investigations have been published or submitted for publication together with some theoretical papers. The work resulted in twenty-two publications which are chronologically listed. A brief outline of the research is given. The work on the crystal structure of Beta Mg 2Al3 is included.

AD-612 280 Div. 25, 30
CFSTI Prices: HC$3.00 MF$0.75

Stanford Research Inst., Menlo Park, Calif.
THE FIELD OF CERTAIN ACOUSTIC RADIATORS.
Final rept.,
by Joel L. Brenner and Vincent Salmon. 31 Dec 64, 56p
Contract Nonr394700, Projs. S R009 01 01, PHU4363
Task 101

Unclassified report

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Descriptors: (*Acoustic properties, Noise generators), (*Noise generators, Acoustic properties), Sound signals, Cylindrical bodies, Spheres, Noise, Polynomials, Programming languages, Programming (Computers).

Calculations are performed to show directionality and similar properties in special acoustical fields. Tabulations are given of the fields of a radiating sphere or cylinder with one or two hot spots. Special noise fields are discussed, and graphs given showing the noise produced by a radiating line source, the energy of the noise being distributed along the radiating line in non-uniform manner.

AD-612 282 Div. 25
CFSTI Prices: HC$4.00 MF$0.75

American Science and Engineering, Inc., Cambridge, Mass.
INVESTIGATION OF GROWTH OF ELECTROMAGNETIC SINGLE CRYSTALS.
Final rept.,
by Carolus M. Cobb, Joseph A. Adamski, and Elbridge B. Wallis. 26 Dec 64, 109p Rept. no. ASE-806
Contract AF19 628 3878, Proj. 5621, Task 562101
AFCRL 65-3

Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Single crystals, Crystal growth), (*Crystal growth, Single crystals), Fluxes (Fusion), Electromagnetic properties, Sapphires, Spinels, Yttrium compounds, Oxides, Iron, Garnets, Fluorides, Beryl, Ruby, Magnesium, Titanates, Cerium compounds, Lanthanum compounds, Molybdates, Silicon compounds, Carbides, Ceramic materials, Manufacturing methods.

Research was carried out on the growth of single crystals of plain and doped sapphire, ruby, spinel, yttrium oxide, magnesium titanate, yttrium iron garnet, beryl, cerium molybdate, lanthanum molybdate, sodium ferrite, and high melting fluorides. The methods of growth which were studied were the Verneuil and Czochralski techniques and growth from a flux. The work resulted in the development of a new three-tube Verneuil burner, as well as the production of more than seventy single crystal boules by the Verneuil process. Preliminary work on a new powder feed mechanism for the Verneuil furnace is described. A long range program for the Czochralski and flux growth of corundum and the initial results from this program are described with the equipment modifications which were necessary. Results from attempts to use the Czochralski method for the production of cerium molybdate, lanthanum molybdate, and yttrium iron garnet are included as well as a review of the technical needs for the laboratory production of single crystals of the metallic fluorides. (Author)

AD-612 288 Div. 25, 9
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
EFFECT OF VOLUMETRIC ABSORPTION COEFFICIENT ON ROSSELAND RADIATIVE HEAT TRANSFER,
by R. L. Spicer. Jan 65, 18p Rept. no. P-3061

Unclassified report

Descriptors: (*Heat transfer, Fluid flow), (*Fluid flow, Heat transfer), Incompressible flow, Flat plate models, Absorption, Temperature, Heat transfer coefficients, Partial differential equations.

In calculating the temperature profile and heat transfer associated with an optically dense fluid it has been the practice to use Rosseland's approximation for the radiative heat flux, since its form lends itself well for use in partial differential equations. However, very little is known about the form of the absorption coefficient which is the fluid-characteristic term in the approximation. It is revealed in this analysis that in the case of uniform fluid (optically dense) flow past a flat plate, the calculated temperature profiles and heat transfer to the wall by radiation alone are very sensitive to the choice of the form of the absorption coefficient. (Author)

AD-612 294 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Weizmann Inst. of Science, Rehovoth (Israel).
COLLISION BROADENING OF OH EMISSION LINES, MEASURED IN THE INFRARED,
by S. H. Bauer and J. H. Jaffe. Nov 64, 26p
Technical (scientific) note no. TSN-11
Contract AF61 052 388
AFCRL 65-133

Unclassified report

Descriptors: (*Emissivity line spectrum), (*Hydrogen, Flames), (*Oxygen, Flames), Molecular spectroscopy, Spectra (Infrared), Spectra (Visible and ultraviolet), Hydrochloric acid, Water, Resonance.

The OH emission spectrum from an H2/O2 flame was recorded in the infrared, for the (1-0) vibrational transition of the ground 2 pi sub i state. The spectral region covered was 3.18 to 3.65 microns (four lines each for P(10) to P(18)). Use of a high resolution spectrometer with a slit-width (full width at half maximum) of 0.06 to 0.04/cm allowed the direct estimation of line-widths, which were found to range from 0.11/cm for the P(10) lines to 0.08/cm for the P(18) lines. A discussion is included of the implications of the observed collisional line widths. (Author)

AD-612 297 Div. 25, 17
CFSTI Prices: HC$2.00 MF$0.50

Massachusetts Inst. of Tech., Cambridge. Dept of Metallurgy.
RADIAL DISTRIBUTION FUNCTIONS IN SOLID COBALT.
Master's thesis,
by Rune Gunnar Lagneborg and Roy Kaplow.
23 Dec 64, 48p Rept. no. DSR-7618, Technical rept. no. TR-9
Contract Nonr184135

Unclassified report

Descriptors: (*Cobalt, Crystal lattices), (*Crystal lattices, Cobalt), (*Phase studies, Cobalt), Solids, X-ray diffraction analysis, Statistical functions, Vibration, Crystallography, Transition temperature, Atomic properties, Thermodynamics, Elasticity.

Radial distribution functions have been calculated from x-ray diffraction data by means of digital computer programs for Co-alpha (h.c.p.) and Co-beta (f.c.c.) near the allotropic transformation temperature. These functions provide values of lattice parameters, mean square amplitudes of vibration, vibrational coupling factors, and the mean force potential function. The mean square amplitude of vibration u-2s for alpha and beta at 417C are 0.0155 sq A and 0.0168sq A, which correspond to Debye temperatures of 332K and 320K, respectively. The Debye temperature and coupling factors obtained for beta at 417C were consistent with a second experimental distribution function determined at 678C, indicating that those parameters are essentially invariant over that range of temperature. From the mean force potential functions the elastic moduiii for nearest neighbor directions have been determined. In both alpha-and beta-phase the measured value is approximately 2.1 x 10 to the 12th power dynes/sq cm. The difference between the nearest neighbor potential minima in the alpha- and beta-phases at 417C is 100 cal/gram atom. (Author)

AD-612 298 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

California Univ., Berkeley.
NUCLEAR QUADRUPOLE RESONANCE AND THE ELECTRONIC STRUCTURE OF GALLIUM.
Doctoral thesis,
by Sheldon Russell Kiser. Jan 65, 93p
Technical rept. no. TR-7
Contracts Nonr365605, Nonr22294,
Proj. RR 007 01 01

Unclassified report

Descriptors: (*Gallium, Nuclear resonance), (*Nuclear resonance, Gallium), (*Solid state physics, Gallium), (*Atomic energy levels, Electron transitions), Electric fields, Hyperfine structure, Spectrum analyzers, Goniometers, Symmetry (Crystallography), Tensor analysis, Operators (Mathematics), Magnetic fields, Single crystals.

An investigation of the nuclear quadrupolar coupling in solid Gallium metal is carried out with the aid of experiments on a single metallic crystal. Two physically inequivalent sites for the electroc field gradient tensor are found and the orientation of each set of principle axes is determined. A previous measurement of the asymmetry parameter of the electric gradient tensor is described and an imprived value, 0.175 ± 0.010 is reported. The asymmetry parameter may be obtained from the measurement of the splitting of the inner and outer pairs of the zeeman spectrum when the magnetic field lies in the principle XY plane. The error in the measurements arising from a neglect of the azimuthal dependence of the splitting in the XY plane is given. A theory of the origin of the field gradient tensor based upon p-type bonding of a Gallium atom with its first seven nearest neighbors predicts the quadrupolar coupling constant within 5% of the experimental value. The results suggest that the electronic structure may be described in the tight binding approximation. (Author)

AD-612 300 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Pennsylvania Univ., Philadelphia.
MAGNETOSTRICTION, FORCED MAGNETOSTRICTION, AND ANOMALOUS THERMAL EXPANSION IN FERROMAGNETS,
Technical rept.,
by Earl Callen and Herbert B. Callen. Jan 65, 63p
Rept. no. TR-20
Contract Nonr55136

Unclassified report

See also AD-609 552.

Descriptors: (*Ferromagnetic materials, Magnetostriction), (*Magnetostriction, Ferromagnetic materials), (*Ferromagnetism, Field theory), Crystal lattices, Magnetic fields, Statistical functions, Numerical analysis, Operators (Mathematics), Thermal expansion, Dysprosium, Gadolinium, Europium compounds, Sulfides, Brillouin zones, Spin, Energy, Temperature.

The theory of magnetostriction arising from single-ion crystal field effects, for cubic crystals, is summarized, extended to arbitrary crystal symmetry, and augmented by the inclusion of two-ion interactions. The dependence on magnetic field strength (the 'forced magnetostriction'), is analyzed and the totally symmetric component (which exhibits itself as an anomalous thermal expansion is discussed. The paper presents expressions relating the macroscopic magnetostriction coefficients to the product of microscopic magnetoelastic coupling constants and certain spin correlation functions. Only three such correlation functions appear, and all temperature and field dependence enters through these correlation functions. The paper evaluates these correlation functions by various approximate theories; molecular field theory, a cluster theory, and the random phase approximation. Applications to Dy and to EuS are cited, and a detailed application to Gd is given.

AD-612 301 Div. 25
CFSTI Prices: HC$7.00 MF$1.75

National Bureau of Standards, Washington, D. C.
TABLES OF THERMODYNAMIC PROPERTIES OF AIR IN CHEMICAL EQUILIBRIUM INCLUDING SECOND VIRIAL CORRECTIONS FROM 1500K TO 15,000K.
by Joseph Hilsenrath and Max Klein. Mar 65, 346p
Contracts AF40 600 59 24, AF40 600 63 136,
Projs. 8950, 8951, Task 895003
AEDC TR-65-58

Unclassified report

Descriptors: (*Air, Thermodynamics), (*Thermodynamics, Air), Chemical equilibrium, Dissociation, Ionization, Gases, Mixtures, Gas analysis, High-temperature research, Tables.

Tables for the thermodynamic properties for air are presented which take into account the effect of dissociation and ionization and the limiting-law Debye-Huckel and second virial corrections upon the thermodynamic properties and the equilibrium compositions. Values are tabulated from 1500K in steps of 100K to 15,000K at close spacings in the logarithm of the density (log rho/rho sub o = -7. (0.2)2.2) for the compressibility factor Z = PV/RT; the dimensionless functions for: internal energy, E/RT; enthalpy, H/RT; entropy, S/R Xi; log P(atm) and Z = sigma C sub i. The underlying equations and the input data are discussed briefly. The effects of the real gas corrections on the equilibrium properties are illustrated graphically. The equilibrium composition is given for selected temperatures over the tabulated density range. The wide range of temperatures and densities over which the thermodynamic properties have been tabulated make the tables useful in a variety of engineering design and test programs, and in scientific research and development. (Author)

AD-612 309 Div. 25, 15

Iowa State Univ., Iowa City.
ON THE DEFINITION OF SCATTERING IN RELATIVISTIC QUANTUM FIELD THEORY,
by R. Fong. 7 Apr 64, 15p
Grant AF AFOSR517 64
AFOSR 65-0412

Unclassified report

Pub. in Nuovo Cimento (Italy) v33 (ser10) p1422-36 Sep 1 1964(Copies available only to DDC users). Research supported in part by the National Science Foundation, Washington, D. C.

Descriptors: (*Field theory, Scattering), (*Relativity theory, Quantum mechanics), (*Quantum mechanics, Field theory), Bosons, Hamiltonian, Operators (Mathematics).

A relativistic interacting theory for neutral bosons and in which there can be no stable bound states is studied. The theory is obtained by embedding two-particle relativistic quantum mechanics in quantum field theory by means of a procedure recently given by Sudarshan. This results in a theory in which there is scattering in the two-partical channel only. An 'interacting' field operator psi(x) is defined for the theory. It is then found that under the usual formulation of axiomatic quantum field theory psi(x) must be regarded as a 'local free-field operator'. However, there is inherent in psi(x) scattering information. A new asymptotic condition for field operators is then proposed, whereby this scattering information may be extracted. A heuristic discussion of the physical significance of the asymptotic condition is also given. (Author)

AD-612 310 Div. 25, 2, 15

Iowa State Univ., Iowa City.
A METHOD OF SOLVING THE MANY-BODY K-MATRIX WITH A YUKAWA INTERACTION POTENTIAL,
by K. W. Wong. 24 Aug 64, 4p
Grant AF AFOSR517 64
AFOSR 65-0413
Unclassified report

Pub. in Nuovo Cimento (Italy) v34 (ser10) p816-8 Nov 1 1964 (Copies available only to DDC users).

Descriptors: (*N-body problem, Matrix algebra), (*Matrix algebra, N-body problem), (*Potential theory, N-body problem), Fourier analysis, Series, Special functions (Mathematical).

AD-612 311 Div. 25, 2, 15

Iowa State Univ., Iowa City.
A METHOD OF SOLVING THE MANY-BODY K-MATRIX,
by K. W. Wong. 7 Apr 64, 9p
Grant AF AFOSR517 64
AFOSR 65-0414
Unclassified report

Pub. in Nuovo Cimento (Italy) v34 (ser10) p591-8 Nov 1 1964 (Copies available only to DDC users). Research supported in part by the National Science Foundation, Washington, D. C.

Descriptors: (*N-body problem, Matrix algebra), (*Matrix algebra, N-body problem), Potential theory, Series, Quantum statistics, Integral transforms, Fermions, Bosons, Gases.

AD-612 314 Div. 25, 4, 8, 14

Illinois Univ., Urbana.
MICROWAVE AND ELECTRO-OPTICAL PROPERTIES OF CARBON DISULFIDE,
by O. L. Gaddy, D. F. Holshouser, and R. E. Stanfield. 1963, 8p
Grant AF AFOSR62 250
AFOSR 65-0439
Unclassified report

Pub. in mono. Quantum Electronics III, Columbia Univ. Press, v1 p1679-86 1964 ( ) (Copies available only to DDC users).

Descriptors: (*Microwave equipment, Modulators), (*Modulators, Materials), (*Kerr cells, Materials), (*Carbon compounds, Sulfides), Electrical properties, Microwave frequency, Optical properties, Electrostatics, Traveling-wave tubes.

Carbon Disulfide is an excellent microwave dielectric, whose Kerr constant and breakdown can be enhanced by cooling. The microwave power required in a parallel-plane travelling wave Kerr cell is limited at 3 Gc by the conductor losses rather than by the dielectric losses. On the basis of the calculations and experimental results, it appears that a Kerr cell no longer than one meter could provide continuous and complete light modulation with microwave power less than 25 watts. Carbon Disulfide has the rather obvious advantages over solid-state materials in that it is much easier to pour liquid out of a bottle than to grow a nearly perfect crystal, and the nonuniform birefringence produced by dielectric loss induced temperature gradients is less of a problem with a liquid. (Author)

AD-612 316 Div. 25

Illinois Univ., Urbana.
AN INTERNALLY REFLECTING OPTICAL RESONATOR WITH CONFOCAL PROPERTIES,
by D. F. Holshouser. 1963, 6p
Contract AF49 638 556; Grant AF AFOSR62 250
AFOSR 65-0438
Unclassified report

Pub. in mono. Quantum Electronics III, Columbia Univ. Press, v1 p1454-8 1964 ( ) (Copies available only to DDC users).

Descriptors: (*Resonators, Optical equipment), (*Mirrors, Spheres), (*Masers, Mirrors), Glass, Neodymium, Reflection.

A confocal system is defined as an optical resonator using spherical mirrors; advantages of the confocal system over the planar mirror are that the diffraction losses for the former can be much lower and its alignment is less critical. The confocal resonator has the following basic properties: (1) a ray leaving one mirror at the axis is reflected back to that point by the opposing mirror after a single reflection; (2) a ray parallel to the axis leaves one mirror and returns to that point after three reflections; and (3) the path length for a complete transit of any ray leaving the axis at one mirror is independent of the ray angle. A configuration for such a confocal resonator is derived mathematically; with it confocal properties may be obtained without reflecting coatings. A semi-confocal optical maser was fabricated from a 50-mm-long, 6-mm-diameter cylindrical rod with one ground end and one coated to give a few percent transmission. The material was Schott barium crown glass doped with neodymium. Stimulated emission was obtained, and threshold input energy at room temperature was less than for a planar ruby of the same dimensions.

AD-612 317 Div. 25

Brussels Univ. (Belgium).
RESPONSE FUNCTIONS, SUPERCONDUCTIVITY AND FERRO-MAGNETISM IN THE MANY FERMION SYSTEM,
by H. Stern and R. Brout. 21 Oct 63, 25p
Grant AF EOAR63 51
AFOSR 65-0419
Unclassified report

Pub. in Physica (Netherlands) v30 p1689-712 1964
Copies available only to DDC users.

Descriptors: (*Fermions, Superconductivity), (*Superconductivity, Fermions), (*Ferromagnetism, Fermions), Magnetic properties, Phase studies, Specific heat, Thermodynamics, Hamiltonian, Belgium.

At the phase transition, the anomalies of thermodynamic and static response functions coincide due to the fact that the free energy, expressed in terms of response functions at imaginary frequency including zero, has its pole at zero frequency. In this paper, a study is made of the divergences arising from the modification of the vertex function. The diamagnetic current is related to the free energy via the Ward Identity so that the specific heat anomaly inevitably gives rise to the Meissner effect. Below the transition the system adjusts to the singularity by going into the BCS condensed state. The similarity between BCS theory (J. Bardeen, L. Cooper, and J. Schrieffer. Phys. Rev. 108:1175 (1957)) and ferromagnetism is shown through a Weiss field approach and diagrammatically by including special correlations between k and -k. Its importance for an understanding of the broken symmetry problem is discussed. Finally, the parallel behaviour of the susceptibility and specific heat of a Bloch ferromagnet is demonstrated. (Author)

AD-612 320 Div. 25

Brussels Univ. (Belgium).
RECENT RESEARCHES ON COHERENCE PROPERTIES OF LIGHT,
by E. Wolf. 1963, 23p
Grant AF AFOSR237 63
AFOSR 65-0436

Unclassified report

Pub. in mono. Quantum Electronics III, Columbia Univ. Press, v1 p13-34 1964 (Copies available only to DDC users).

Descriptors: (*Light, Optics), (*Optics, Light), Lasers, Stochastic processes, Light transmission, Quantum mechanics.

A brief review is presented of the basic notions and results of a theory formulated within the framework of classical optics to explain optical coherence phenomena. A stochastic description of light is given. Coherence effects of the second and fourth order are also presented.

AD-612 322 Div. 25

Duke Univ., Durham, N. C.
SUBMILLIMETER-WAVE SPECTRA OF HCl AND HBr,
by Gordon Jones and Walter Gordy. 9 Jul 64, 6p
Grant AF AFOSR493 64
AFOSR 65-0410

Unclassified report

Pub. in Physical Review (U. S.) v136 n5A pA1229-32 Nov 30 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Microwave spectroscopy, Hydrochloric acid), (*Hydrochloric acid, Microwave spectroscopy), (*Hydrogen compounds, Bromides), Molecular spectroscopy, Band spectrum, Selection rules, Molecular rotation, Quantum mechanics, Ground state, Nuclear magnetic moments.

The J=O to 1 transitions of HCl and HBr were measured in the wavelength regions of 0.59 and 0.48 mm respectively. These measurements led to the following values of molecular constants: for HCl (35), v sub 0 = 625 919.24 ± 0.52 Mc/sec, eQq = 63.0 ± 28 Mc/sec, C sub I equals approximately 0, B sub 0 = 312 991.30 ± 0.26 Mc/sec, B sub e = 317 587 Mc/sec, r sub 0 = 1.2838 sub 7 A, r sub e = 1.2745 sub 5 A; for H Br (79), V sub 0 = 500 675.24 ± 0.52 Mc/sec, eQq = 535.4 ± 1.4 Mc sec, C sub I = 0.25 ± 0.20 Mc/sec, B sub 0 = 250 360.78 ± 0.13 Mc/sec, B sub e = 253 790 Mc/sec, r sub 0 = 1.4243 sub 9 A, r sub e = 1.4146 sub 0 A; and for HBr (81), v sub 0 = 500 519.41 ± 0.26 Mc/sec, eQq= 447.9 ± 1.4 Mc/sec, C sub I = 0.31 ± 0.20 Mc/sec, B sub 0 = 250 282.88 ± 0.13 Mc/sec, B sub e = 253 710 Mc/sec, r sub 0 = 1.4140 sub 2 A, r sub e = 1.4146 sub 0 A. (Author)

AD-612 323 Div. 25, 4

Duke Univ., Durham, N. C.
MILLIMETER WAVE SPECTROSCOPY OF UNSTABLE MOLECULAR SPECIES. II. SULPHUR MONOXIDE,
by Manfred Winnewisser, K. V. L. N. Sastry, R. L. Cook, and Walter Gordy. 27 Apr 64, 7p
Grant AF AFOSR493 64
AFOSR 65-0411

Unclassified report

Pub. in Journal of Chemical Physics (U.S.) v41 n6 p1687-91 Sep 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sulfur compounds, Monoxides), (*Microwave spectroscopy, Free radicals), Molecular spectroscopy, Molecular rotation, Band spectrum, Molecular electronics, Photochemistry, Excitation, Electrons. Spin, Selection rules, Ground state.

Several spectral transitions of the gaseous free radical SO have been observed in the millimeter wave region. Analysis of the observed lines confirms that the molecule has a 3 sigma ground state and leads to the rotational constants B(0)=21 523.75 Mc/sec and D(0)=0.0334 Mc/sec, also to the magnetic coupling constants lamda= 158209.4 Mc/sec and gamma=164.52 Mc/sec. The assignments and analysis are confirmed by a close fitting, within approximately 1 Mc/sec, of all measured and calculated frequencies, and by the Zeeman effect which is measured and analyzed for several transitions. (Author)

AD-612 325 Div. 25

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
HIGH MAGNETIC FIELD RESEARCH,
by Benjamin Lax. 1963, 5p
Contract AF19 604 7344
AFOSR 3567

Unclassified report

Pub. in Journal of Applied Physics (U. S.) v33 n3 suppl. p1025-29 Mar 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetic fields, Scientific research), Solid state physics, Magnets, Electromagnetic pulses, Magnet coils, Water, Cooling, Cryogenics, Superconductivity, Physics laboratories.

The use of high magnetic fields as a research tool for a wide variety of physical phenomena is clearly recognized today and the subject of an International Symposium at Cambridge this fall. This paper reviews the highlights of the conference which included papers on research in plasma physics, low temperatures, solid state and the latest developments for generating high magnetic fields.

The plans and objectives of the National Magnet Laboratory and description of the physical facilities are presented. In addition, a brief review will be given of a number of experiments already performed in the existing Magnet Laboratory.

AD-612 327 Div. 25

Sloane Physics Lab., Yale Univ., New Haven, Conn.
SIMULTANEOUS LASER OSCILLATION ON THE NEON DOUBLET AT 1.1523 micron,
by W. R. Bennett, Jr. and J. W. Knutson, Jr. 11 May 64, 2p
Grant AF AFOSR626 64
AFOSR 65-0416

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (U. S.) v52 n7 Jul 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Neon), (*Neon, Lasers), Oscillation, Atomic energy levels, Electron transitions, Gas discharges, Helium, Beams (Electromagnetic), Intensity, Quantum mechanics.

The inversion possibilities on the 2s sub 4 to 2 p sub 7 neon transition were examined. Oscillation was obtained on this transition under two different conditions: first, using electron impact in pure neon; second, in helium-neon mixtures, through use of stimulated emission pumping and multiply-resonant mirror coatings. Only the electron impact results appear of practical value for precision measurements. Beam powers approx. 1 mw were obtained simultaneously from these two transitions in discharges containing pure neon and the gain coefficients for these two lines appear sufficient to permit simultaneous single mode operation in sammaller cavities. The present gain measurements are compatible with the previous data at 1.1523 micron and the assumption of a reciprocal diameter dependence of the inversion density at optimum excitation.

AD-612 330 Div. 25, 20

James Forrestal Research Center, Princeton Univ., N. J.
EFFECT OF NONCOLLIMATED RADIATION ON SURFACE ACTIVITY METHODS FOR THE DETERMINATION OF DIFFUSION COEFFICIENTS IN SOLIDS.
by R. H. Condit and C. E. Birchenall.
14 Jun 55, 4p Rept. no. TP-4301E
Contract AF18 600 967
AFOSR 3560

Unclassified report

Pub. in Journal of Metals (U. S.)v8 p1-4 Oct 1956 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Diffusion, Solids), (*Solids, Diffusion), (*Radiation damage, Surface properties), Autoradiography, X rays, Monochromatic light, Absorption, Solid state physics.

The contributions of radiations arriving at a diffusion specimen surface, including angles other than 90 degrees, were evaluated for anumber of counting geometries. Modifications are proposed for the Steigman, Shockley, and Nix equation for the surface activity method, the Gruzin equation for the residual activity method, and the Gatos and Kurtz equation for autoradiography on an oblique section through the diffusion zone. The theoretical equations for absorption of a divergent beam from a plane source as detected at a point counter shown to agree with experimental results for extended counters under not very restricted conditions. MnK alpha radiation from Fe55 was used to obtain a monochromatic source of X-rays. (Author)

AD-612 335 Div. 25

Rensselaer Polytechnic Inst., Troy, N. Y.
WAVE PROPAGATION IN NON-SIMPLE MEDIA,
by B. A. Fleishman. 1963, 8p
Contract AF49 638 514
AFOSR 3674

Unclassified report

Pub. in mono. International Symposium on Nonlinear Differential Equations and Nonlinear Mechanics, Academic Press, p211-7 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Propagation, Mathematical analysis), (*Differential equations, Propagation), Differential geometry, Functions, Algebra, Velocity.

AD-612 336 Div. 25

Minnesota Univ., Minneapolis.
SPIN RESONANCE OF POINT DEFECTS IN MAGNESIUM OXIDE,
by John E. Wertz, John W. Orton, and P. Auzins.
1961, 7p
Contract AF49 638 683
AFOSR 3586

Unclassified report

Pub. in Journal of Applied Physics suppl v33 n1 p322-8 Jan 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetic resonance, Crystal lattice defects), (*Crystal lattice defects, Magnetic resonance), (*Magnesium compounds, Oxides), Absorption spectrum, Electric fields, Symmetry (Crystallography), Impurities, Vanadium, Chromium, Manganese, Iron, Ions, Transition elements, Heat treatment, Radiation damage.

Transition metal impurity ions and intrinsic defects such as trapped electron and trapped hole centers are readily detected in magnesium oxide crystals by electron spin resonance. The valence state of impurity ions may readily be changed by heat treatment or by irradiation. For nickel and cobalt one may observe both the 2(+) and 1(+) states, while for iron, one additionally observes the 3(+) state. The extra positive charge of trivalent ions is usually compensated by positive ion vacancies. Vacancies, either single or in clusters, alter the electric field symmetry about an impurity ion or intrinsic defect. Negative ion vacancies are difficult to produce except by neutron irradiation. Electrons trapped at negative ion vacancies are largely localized upon the vacancy, as is evident from the small hyperfine splitting of adjacent Mg ions. If crystals are heated in order to lead to association of vacancies, a second type of F center formed. With protracted neutron irradiation, yet a third type of F center is produced. Optical studies are being undertaken to learn more about these paramagnetic centers.

AD-612 340 Div. 25

California Univ., La Jolla.
SUPERCONDUCTIVITY NEAR IMPURITIES,
by H. Suhl, D. R. Fredkin, J. S. Langer, and B. T. Matthias. 24 May 62, 4p
Contract AF49 638 1038
AFOSR 3662

Unclassified report

Pub. in Physical Review Letters (U. S.) v9 n2 p63-5 Jul 15 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Superconductivity, Solid solutions), (*Solid solutions, Superconductivity), (*Impurities, Superconductivity), Transition elements, Transition temperature, Magnetic moments, Resonance scattering, Hamiltonian, Integral transforms.

Resonant scattering of conduction electrons by transition element impurities in dilute solid solution, and localization of a magnetic moment around the impurity can lead to a localized region of coherent pairing of electrons. In this report, the author speculates that resonance effects could also lead to a similarly localized region of coherent pairing of electrons. A model is considered in which the impurity potential is strongly localized (has a constant matrix element) and the one-electron conduction band is characterized by a single peak in its density-of-states curve.

AD-612 341 Div. 25

Illinois Univ., Urbana.
ELECTRONIC STATES ON DISLOCATIONS IN SEMICONDUCTORS.
Revised ed.,
by V. Celli, Albert Gold, and Robb Thomson. 4 Jan 62, 2p
Contract AF49 638 819
AFOSR 3625

Unclassified report

Pub. in Physical Review Letters (U.S.) v8 n3 pC 528 1-2, 2-2. Copies not available to DDC or Clearinghouse customers. Research supported by U.S. Office of Naval Research.
Revision of rept. dated 28 Nov 61.

Descriptors: (*Semiconductors, Crystal lattice defects), (*Crystal lattice defects, Semiconductors), Atomic energy levels, Electron transitions, Electrons, Density, Strain (Mechanics), Hamiltonian, Partial differential equations.

The investigation considers a single electron trapped in the strain field of a dislocation. At equilibrium in n-type material there will be a certain low density of electrons on the line. The strong correlation produced by the Coulomb interaction in one dimension may be expected to 'quench' the z motion (perhaps forming a 'lattice' of electrons at very low temperature) and to account for the lack of observable 'extra' conductivity along dislocation lines. In conclusion, it appears that the strain fields associated with dislocations in semiconductors can give rise to acceptor levels near the top of the gap and that these may have a significant influence on the electronic properties of n-type material.

AD-612 342 Div. 25, 15

Microwave Lab., Stanford Univ., Calif.
GRAVITATIONAL INSTABILITIES IN A COMPRESSIBLE COLLISIONAL PLASMA LAYER,
by Bruno Coppi. 1964, 24p Rept. no. ML-1127
Contract AF49 638 1321
AFOSR 65-0393

Unclassified report

Pub. in Annals of Physics (U.S.) v30 n1 p178-200 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasma medium, Stability), (*Gravity, Plasma medium), Differential equations, Compressive properties, Calculus of variations, Magnetic pinch, Magnetohydrodynamics, Ions, Transport properties.

The stability of a plasma layer under the influence of a gravitational field, in conditions where all the dissipative effects due to collisions are important, is investigated by proper asymptotic methods. Small ratios of the kinetic to the magnetic pressure and regimes where the ion Larmor radius effects are not relevant are considered. In these conditions, by comparing the heat diffusion rate due to ion-ion collisions with the mass diffusion rate due to ion-electron collisions, the fastest gravitational modes are found to be isothermal or adiabatic. Therefore, except for a particular set of equilibrium configurations which are examined, the compressibility of the system plays an essential role. As a consequence, the perturbed electric field, associated with the resistivity and the current transverse to the magnetic field, directly enters the stability problem and has the effect of restraining the material from crossing the lines of force. The conditions where stability is possible are then derived. Proper variational methods are given and used in order to determine conditions for marginal stability or growth rates when simple analytic solutions are not available. (Author)

AD-612 346 Div. 25, 15

Harvard Univ., Cambridge, Mass.
EXTERIOR ALGEBRA AND THE ACTION PRINCIPLE, I,
by Julian Schwinger. 27 Feb 62, 9p
Contract AF49 638 589
AFOSR 2639

Unclassified report

Pub. in National Academy of Sciences Proceedings (U. S.) v48 n4 p603-11 Apr 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Algebras, Quantum mechanics), (*Quantum mechanics, Algebras), Groups (Mathematics), Complex numbers, Matrix algebra.

AD-612 348 Div. 25

Northwestern Univ., Evanston, Ill.
HARD-SPHERE APPROACH TO THE EXCITATION SPECTRUM IN LIQUID HELIUM II,
by L. Liu and Lu Sun Liu. 9 Apr 64, 7p
Grant AF AFOSR517 64
AFOSR 65-0415

Unclassified report

Pub. in Physical Review (U. S.) v135 n5A pA1166-72 Aug 31 1964 (Copies not available to DDC or Clearinghouse).

Descriptors: (*Liquefied gases, Helium), (*Helium, Molecular spectroscopy), Spectroscopy, Band spectrum, Mathematical analysis, Hamiltonian, Integral equations, Matrix algebra, Quantum mechanics, Ground state, Bosons, Nuclear scattering, Cryogenics, Excitation.

The excitation spectrum of a Bose system of hard spheres is obtained in a high-density-calculation-including multiple scattering processes. The hard-sphere interaction is represented by a non-Hermitian pseudopotential constructed in a previous work, and the T-matrix method of Brueckner and Sawada is adopted with modifications to take into account the non-Hermitian property of the Hamiltonian. The inclusion of multiple scattering is found essentially to give a screening effect to the two-body interaction in a many-body medium. The screening factor is studied within certain

approximations and is shown to play a very important role in determining the shape of the excitation spectrum. The effect of depletion of particles from the zero-momentum state due to particle interaction is also included in a self-consistent way and is found to be very small. The calculated spectrum is then applied to liquid helium and there is a good qualitative agreement with experiments. Especially, a roton-type dip exists in the spectrum. (Author)

AD-612 349 Div. 25, 4

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
EXCITATION BY ELECTRON IMPACT OF THE QUADRUPOLE-ALLOWED 1 (1)S TO 3 (1)S TRANSITION IN HELIUM,
by Edwin N. Lassettre, Vincent D. Meyer, and Martin S. Longmire. 22 Jul 64, 2p
Grant AF AFOSR61 63
AFOSR 65-0399

Unclassified report

Pub. in Journal of Chemical Physics (U.S.) v41 n9 p2952-4 Nov 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electron transitions, Helium), (*Selection rules, Electron transitions), (*Helium, Electron transitions), Molecular spectroscopy, Electrons, Excitation.

AD-612 350 Div. 25

Dartmouth Coll., Hanover, N. H.
ISOTHERMAL FLOW OF SUPERFLUID HELIUM,
by J. N. Kidder and H. A. Blackstead. 1964, 1p
Grant AF AFOSR74 63
AFOSR 65-0400

Unclassified report

Pub. in American Physical Society. Bulletin (U. S.) v9 p437 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Helium, Cryogenics), (*Cryogenics, Helium), Liquefied gases, Fluid flow, Velocity, Pressure, Reynolds number.

Measurements were made of the isothermal, gravitational flow of superfluid helium at 1.09K in a circular cross section capillary. The capillary is 0.025 cm internal diameter and 70 cm long. Flow between two concentric reservoirs is induced by mechanical displacement of the fluid in the outer reservoir. The inner reservoir is a microwave resonant cavity. The pressure gradient and the fluid velocity are calculated from the cavity resonant frequency and the geometry of the system. The pressure gradient along the capillary varied from 0.001 to 0.005 dynes/cc during the flow measurements, the latter value representing the limit of resolution of the apparatus. The fluid velocity extrapolated to zero pressure gradient is 1 cm/sec, which is interpreted as the superfluid critical velocity. The normal fluid component of the liquid is assumed to be flowing as well as the superfluid, but the observed pressure gradients are too small to be caused by laminar viscous flow at the observed velocities. The pressure gradient has a nonlinear dependence on the fluid velocity, for velocities greater than the critical value, similar to that of ordinary turbulent flow, but the calculated Reynolds number indicates that this cannot be turbulence in the normal fluid. (Report quoted in its entirety)

AD-612 351 Div. 25, 8

Sloane Physics Lab., Yale Univ., New Haven, Conn.
RELAXATION MECHANISMS, DISSOCIATIVE EXCITATION TRANSFER AND MODE PULLING EFFECTS IN GAS LASERS,
by W. R. Bennett, Jr. 1963, 10p
Grant AF AFOSR626 64
AFOSR 65-0437

Unclassified report

Pub. in mono. Quantum Electronics III, Columbia Univ. Press, v1 p441-58 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Gases), (*Relaxation time, Lasers), (*Excitation, Lasers), Masers, Dissociation, Oscillation, Electron transitions, Phase shift, Ground state, Atomic energy levels, Helium, Neon.

AD-612 358 Div. 25, 2, 6
CFSTI Prices: HC$3.00 MF$0.75

AVCO Marine Electronics Office, New London, Conn.
REFLECTION AND SCATTERING OF SOUND BY THE SEA BOTTOM,
by H. W. Marsh, T. G. Bell, and C. W. Horton.
Jan 65, 70p

Unclassified report

Presented at the Meeting of the Acoustical Society of America (68th), 21-24 Oct 64 held at Austin, Tex.

Descriptors: (*Ocean bottom, Acoustics), (*Underwater sound, Ocean bottom), Models (Simulations), Theory, Experimental data, Hydrographic sonar, Sonar, Scattering.

Contents:
Part I Theory
Intensity of Reflection
Distortion of Reflected Wave
Sound scattering
Summary
Part II Field data
Dependence of Bottom Loss on frequency and grazing angle
Lateral variability
Effect of scattering
Summary and conclusions
Part III Model studies
Scale models and their uses
Scale model studies of reflection from sand surfaces
Reflection from plane and sinusoidal surfaces
Reflection from rough surfaces
Summary.

AD-612 378 Div. 25, 20
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE CALCULATION OF LINE STRENGTHS AND SELECTION RULES WITH VARIOUS TYPES OF COUPLINGS,
by Ya. I. Vizbaraite, Z. B. Rudzikas, S. D. Budrite, and A. P. Yutsis. 22 Jan 65, 16p FTD-MT-64-353
TT 65-61820

Unclassified report

Edited machine trans. of Lietuvos Fizikos Rinkinys (Lithuanian SSR) 1961, v. 1, no. 1/2, p. 21-32. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Electron transitions, Selection rules), (*Selection rules, Electron transitions), (*Matrix

algebra, Selection rules), Line spectrum, Atomic structure, Quantum statistics, USSR.

The expressions for matrix elements of electric multipole operator coupling levels with various types of vector coupling are given. The cases of different types of coupling in the initial and final levels are also considered. Selection rules for the mentioned cases are established. They are expressed by polygonal rules presenting nonvanishing conditions of j-coefficients appearing in expressions of matrix elements of electric multipole operator. Maximum number of sides in these polygons is equal to five. (Author)

AD-612 383 Div. 25
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
DETERMINATION OF MOLECULAR FIELD COEFFICIENTS FOR TWO SUB-LATTICE MAGNETIZATIONS BY LEAST SQUARE FIT.
Technical rept.,
by Gerhard Heiche. 28 Dec 64, 26p
Rept. nos. NOLTR-64-6, mathematics dept. rept. M-44
Proj. 742 0041, Task FR30
Unclassified report

Descriptors: (*Magnetism, Crystallography), (*Crystallography, Magnetism), Ferromagnetic materials, Molecular structure, Mathematical analysis, Least squares method, Programming (Computers).

A method is developed which determines, for an experimentally obtained curve of total magnetization versus temperature, the molecular field coefficients of a Two-sublattice model. These coefficients give a theoretical magnetization curve that fits best the experimental one. An IBM 7090 program which calculates these coefficients is described. (Author)

AD-612 416 Div. 25, 27
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SIMILARITY CRITERIA OF MAGNETOHYDRODYNAMIC PHENOMENA AND LOSSES IN ELECTROMAGNETIC POWER IN A CONDUCTIVE LIQUID LAYER BETWEEN ROTOR AND STATOR OF AN ASYNCHRONOUS ELECTRIC MOTOR,
by A. V. Ivanov-Smolenskii and G. S. Tamoyan.
5 Mar 65, 16p FTD-TT-65-171
TT 65-61825
Unclassified report

Unedited rough draft trans. of Iyvestiya Vysshikh Uchebnykh Zavedenii. Energetika (USSR) 1964, v. 7, no. 6, p. 32-39.

Descriptors: (*Liquid metal pumps, Magnetohydrodynamics), (*Magnetohydrodynamics, Liquid metal pumps), (*Electric motors, Models (Simulations)), Rotary pumps, Electrical conductance, Liquids, Magnetic fields, USSR, Velocity, Power, Liquid metals, Laminar boundary layer.

A method is described for finding similarity criteria for electromagnetic and mechanical power losses in a layer of conductive liquid or liquid metal, filling the air gap of a pump motor. Scale coefficients which determine the magnitudes of losses in power are considered.

AD-612 418 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEWS OF THE ACADEMY OF SCIENCES OF THE USSR. PHYSICS SERIES, 1964, VOL. 28, NO. 3 (SELECTED ARTICLES).
5 Mar 65, 25p FTD-TT-65-131
TT 65-61827
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Seriya Fizicheskaya, 1964, v. 28, no. 3, p. 533-536, 540-544, 580-583.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested. Copy is available for public sale.

Descriptors: (*Physics, Reports), (*Ferromagnetic materials, Cryogenics), (*Rare earth elements, Magnetic properties), (*Metallic crystals, Deformation), Nickel, Iron, Magnetic moments, Electric properties, Magnetism, Iron alloys, Silicon alloys, Anisotropy, Heat treatment, USSR.

Contents: Saturation magnetization of ferromagnets at helium temperatures, by N. V. Zavaritskiy and V. A. Tearev; Effect of magnetic order on electric and galvanomagnetic properties of rare earth metals, by N. V. Volkenshteyn, G. V. Fedorov and V. Ye. Startsev; Effect of deformation on the anisotropy of coercive force of iron silicide monocrystals by, Ye. G. Krivonosova and B. G. Livshits.

AD-612 419 Div. 25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MAGNETOHYDRODYNAMIC PHENOMENA IN A LAYER OF CONDUCTIVE ASYNCHRONOUS MOTOR,
by G. S. Tamoyan. 9 Mar 65, 16p
FTD-TT-65-173
TT 65-61828
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Izvestiya, Energetika i Transport, 1964, no. 3, p. 370-377.
Available only for reference use at DDC Field Services.

Descriptors: (*Magnetohydrodynamics, Liquid metal pumps), (*Liquid metal pumps, Magnetohydrodynamics), (*Electric motors, Magnetohydrodynamics), Liquids, Electrical conductance, Laminar boundary layer, Velocity, Boundary value problems, Equations, Motion, Graphics, Statistical analysis, Power.

Described are results of a theoretical investigation of the behavior of a layer of conductive liquid in a gap of an asynchronous motor of infinite length at laminary flow. Presented are formulas for the calculation of slips of elementary liquid layers in the gap and electromagnetic power losses in the layer. Graphs are given for the velocity profile in the gap at various Hartman numbers and rotor slippages. (Author)

AD-612 421 Div. 25
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MAKING USE OF THE PHENOMENON OF POSITIVE SURFACE IONIZATION IN INVESTIGATIONS OF CATHODE ATOMIZATION OF METALS,
by E. F. Chaikovskii and G. V. Ptitsyn. 9 Mar 65, 7p FTD-TT-65-175
TT 65-61830
Unclassified report

Unedited rough draft trans. of Zhurnal Tekhnicheskoi Fiziki (USSR) 1964, v. 34, no. 12, p. 2194-2196.

Descriptors: (*Platinum, Atomization), (*Nickel, Atomization), (*Ion beams, Atomization), (*Atomization, Metals), Potassium, Ionization, Cathodes, Ion bombardment, USSR.

Determination was made of the coefficients of cathode atomization (N) of Pt and Ni by bombardment with positive ions of K(+) in the range of energies of incident ions from 100 to 500 v. It was established that N as a function of the energy of the bombarding ions has a linear character. (Author)

AD-612 424 Div. 25, 17
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INTERRELATION OF ORDERING AND MAGNETIZATION PHENOMENA OF FERROMAGNETIC ALLOYS WITH HEXAGONAL DENSELY PACKED LATTICE,
by D. R. Rizdv'yanets'kii. 5 Mar 65, 15p
FTD-TT-65-133
TT 65-61831

Unclassified report

Unedited rough draft trans. of Ukrayins'kyi Fizychnyi Zhurnal (USSR) 1964, v. 9, no. 3, p. 309-317. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Crystallography, Ferromagnetic materials), (*Ferromagnetic materials, Alloys), (*Magnetism, Crystallography), Crystal lattices, Transition temperature, Phase studies, Equation of state, USSR, Crystal structure.

The ordering of ferromagnetic alloys of type AB and AB sub 3 with a hexagonal close-packed lattice was studied. It was found that in these alloys, as in alloys with a cubic lattice of beta-brass and Cu3Au types a mutual effect of noted of the processes of ordering of atoms and magnetization of alloys. Formulae are obtained for the temperatures of the phase transformations of the second kind and their dependence on the alloy composition, the degree of ordering of the atoms and the atoms and the degree of spontaneous magnetization is established. In the case of transitions of the first kind the temperatures of the transitions will be somewhat higher than those determined by the formulae obtained. (Author)

AD-612 440 Div. 25

Duke Univ., Durham, N. C.
CRITICAL VELOCITIES AND BOUNDARY INTERACTIONS IN THE ISOTHERMAL FLOW OF SUPERFLUID HELIUM,
by J. N. Kidder and W. M. Fairbank. 2 Apr 62, 9p
Grant AF AFOSR62-87
AFOSR 2865

Unclassified report

Pub. in Physical Review (U. S.) v127 n4 p987-94 Aug 15 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Helium, Cryogenics), (*Cryogenics, Helium), Liquefied gases, Fluid flow, Velocity, Pressure, Vortices, Hydrodynamics, Capillary tubes, Microwave equipment, Calibration, Boundary layer.

The pressure gradient as a function of the superfluid velocity in a 1.1-mm-diam capillary was measured at four temperatures between 1.26 and 1.57K. In the flow tube the normal fluid was held at rest by ultrafine porosity filters, while the superfluid flowed isothermally. Superconducting microwave cavities were used as level indicators, making it possible to detect pressure gradients as small as 0.0003 dyn/cc. A critical superfluid velocity, below which no pressure gradient could be detected, was observed directly. The critical velocity decreased linearly with temperature, being 1.25 mm/sec at 1.26K, and 0.85 mm/sec at 1.57K. For a superfluid velocity greater than the critical velocity, the variation of the pressure gradient with velocity was described. It is believed that this represents an interaction between vorticity in the superfluid and the wall of the flow tube. (Author)

AD-612 448 Div. 25, 20

Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
PROPERTIES OF THE 4.431-MeV EXCITED STATE OF Na(23),
by F. R. Metzger. 11 Jun 64, 6p

Unclassified report

Research supported by U. S. Office of Naval Research.
Pub. in Physical Review (U. S.) v136 n2B pB1355-59 7 Dec 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sodium, Atomic energy levels), (*Atomic energy levels, Sodium), Resonance scattering, Fluorescence, Line spectrum, Doppler effect, Nitrogen, Proton bombardment, Alpha particles, Carbon, Electron transitions, Nuclear spins, Absorption spectrum, Atomic orbitals, Field theory.

Using the Doppler-broadened 4.43-MeV gamma line from the reaction N(15)(p, alpha)C(12) as the exciting radiation, resonance fluorescence from the 4.431-MeV level in Na(23) was observed. The 4.437 MeV ground-state transition, accounting for (95±3)% of the de-excitations, exhibits an isotropic angular distribution. This fact and the absence of branching to the 0.44-MeV 5/2 + level make 1/2 the most probable spin assignment. With this spin value, a self-absorption study leads to a partial width of (2.14±0.10)eV for the ground-state transition. When this width is combined with the observed branching, a total width of (2.25±0.20)eV is obtained for the 4.431-MeV level in Na(23), which is found to populate also the 2.39 MeV excited state in (5±3)% of its decays. A comparison of scattering and self-absorption data for different values of the ratio of natural width to Doppler width confirms the spin assignment of 1/2 to the 4.431-MeV level, which might be the first member of the K=1/2- band based on the Nilsson orbit 14. For a value ETA=+4 of the deformation parameter, the E1 transition probability calculated with Nilsson wave functions agrees with the experimental value. (Author)

AD-612 449 Div. 25, 20

Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
PROPERTIES OF THE 7.10MeV LEVEL OF Na(23),
by C. P. Swann. 20 Jul 64, 5p

Unclassified report

Research supported by U.S. Office of Naval Research.
Pub. in Physical Review (U.S.) v136 n5B pB1355-59 7 Dec 64 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sodium, Atomic energy levels), (*Atomic

energy levels, Sodium), Resonance scattering, Fluorescence, Fluorine, Proton bombardment, Alpha particles, Oxygen, Line spectrum, Doppler effect, Electric moments, Nuclear spins, Absorption spectrum, Electron transitions, Parity, Quantum statistics.

Some properties of the 7.1-MeV level of Na(23) were studied using the resonance fluorescence technique with the F(19) (p, alpha) O(16) reaction serving as the source of Doppler-broadened radiation. By comparison with the (7.115±0.003)-MeV level of O(16) the energy was determined to be (7.10±0.02) MeV. The angular distribution of the scattered radiation is 1 + (0.47±0.09)P-2 + (0.32±0.03) P-4, which is consistent only with 5/2 for the spin. The values allowed for the quadrupole-dipole amplitude ratio, delta, are -1.8> delta > -2.2 and 2.5 < delta < 3.0. Using this spin value and the results of the self-absorption measurement, the partial width for the ground-state transition becomes equal to (0.62±0.07) eV. With the observed branching of 63% to the ground state, the total width becomes (0.98 ±0.12) eV. This large value of the width combined with the large value of delta defines the parity of the state as positive. (Author)

26. Production and Management

AD-611 541 Div. 26, 18, 32
CFSTI Prices: HC$5.00 MF$1.00

Stanford Univ., Calif.
CONTINGENT PRICING POLICIES,
by Eugene P. Durbin. 30 Dec 64, 169p
Technical rept. no. TR-76
Contract Nonr22553, Proj. NR042 002
Unclassified report

Descriptors: (*Economics, Government procurement), (*Government procurement, Economics), (*Optimization, Government procurement), Production control, Quality control, Operations research, Mathematical programming.

A production and procurement situation is described in which the producer and consumer of some commodity negotiate a contract under which the consumer purchases a batch of N items and pays a unit price, phi(x), determined by the result of sampling n (< or = N) items from the batch. It is assumed that the producer can control the quality, p, of the commodity to a known degree at a known cost, h(p), and further that given phi(x) and n the producer selects p to maximize expected net return. Therefore the consumer must choose phi(x) and n to maximize his own net return under the producer's optimal action. Under the additional assumptions that phi(x) is bounded and that the contract must provide for protection against incorrect payment due to sampling variation it is shown that at a fixed (n,p) optimal price schedules must be solutions to a specified linear programming problem, and that for fixed n, if the consumer desires the producer to select p = p sub o, and seeks phi(x) to both maximize producer expected net return at p sub o and minimize the mean square difference between actual producer profit at p sub o and negotiated profit, under weak conditions the optimal phi(x) is piecewise linear. A computational procedure for seeking optimal price functions is described, and several hypothetical examples are presented. (Author)

AD-611 545 Div. 26, 15, 32
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif. Dept. of Statistics.
STATISTICAL CONTROL OF A BERNOULLI PROCESS,
by Howard M. Taylor. 4 Feb 65, 47p
Technical rept. no. TR-79
Contract Nonr22553, Proj. NR042 002
Unclassified report

Descriptors: (*Statistical processes, Control), (*Operations research, Industrial production), Probability, Quality control, Sampling.

The optimal statistical control of a simple production process which has only two underlying states, good and bad, is studied. The produced items are classified as good or defective, a cost being associated with each defective item produced. A cost is also charged for repairing the process, which has the effect of returning the process to the good state. Other than immediately after repair, the process state is assumed unknown. One seeks a statistical control rule which, based on the quality history of produced items, tells when to repair the machine. A feasible means of computing the control rule which minimizes the average cost per unit time is given. The nature of the solution is such that once tables of operating characteristics have been prepared, the solutions to a wide variety of problems may be had through slight additional hand calculations. The optimal rule is shown to be relatively insensitive to errors in estimating the model parameters. A means of checking, over a long period of time, whether or not estimates are correct has also been suggested. (Author)

AD-611 578 Div. 26
CFSTI Prices: HC$2.00 MF$0.50

Clapp (William F.) Labs., Inc., Duxbury, Mass.
METAL FASTENINGS, 1959 SERIES.
Final rept.
20 Jan 65, 29p Rept. no. 13091
Contract NObs78875
Unclassified report

Descriptors: (*Metals, Fastenings), (*Fastenings, Metals), (*Wood, Fastenings), Brass, Bronze, Zinc coatings, Nickel alloys, Copper alloys, Copper compounds, Formates, Sea water, Underwater, Tests, Processing, Paints, Coatings.

In order to evaluate metal fastenings when used with mahogany and red oak plywood treated with copper formate, Celcure or tributyl tin oxide, and using bronze, Monel, galvanized or brass fastenings, a total of 112 panels containing fastenings of 4 different alloys were tested in Duxbury Bay water for 63 months. The panels were assembled so that the fastenings were tested in Celcure, copper formate, tributyl tin oxide and untreated panels of mahogany and red oak; painted or unpainted; and the heads embedded flush or countersunk and plugged with the same material. The species of wood had no appreciable effect on the fastenings. Countersunk and plugged is the most satisfactory method of embedding the fastenings. Painted panels were better than unpainted panels. Tributyl tin oxide treatment gave the best overall performance. There were 11 failures in the test; all galvanized. The difference in average weight loss in the top 25% of all fastenings was 0.23%. The top 25% consisted of 12 Monel, 9 brass and 7 bronze panels. The fastenings in 104 out of the 112 panels were in good enough condition to be replaced in service.

AD-611 589 Div. 26, 17
CFSTI Prices: HC$2.00 MF$0.50

Allegheny Ludlum Steel Corp., Brackenridge, Pa.
EXTRUDING AND DRAWING MOLYBDENUM TO COMPLEX THIN H-SECTION.
Interim technical engineering rept. no. 5, 15 Jul 64-15 Jan 65,
by P. A. Santoli. Jan 65, 50p
Contract AF33 657 11203, Proj. 8 112
RTD TR-8-112
Unclassified report

See also AD-605 614.

Descriptors: (*Molybdenum alloys, Extrusion), (*Extrusion, Molybdenum alloys), Titanium alloys, Zirconium alloys, Carbon alloys, Surface properties, Dies, Lubrication, Microstructure, Abrasive blasting, Hardness, Zirconium compounds, Oxides, Beams (Structural), Powder metallurgy.

Thirteen H-shaped extrusions of wrought arc-cast TZM were made using maximum possible billet length of nine inches. A completed extrusion was possible to .058-.062-inch web thickness from 3360F billet temperature. This extrusion was also accomplished from 3300F with low carbon, wrought arc-cast TZM. As-extruded quality was good in surface finish and web dimensional run-out for twenty-foot lengths. However, considerable

growth in fillet-radii occurred starting at a location of ten to twelve feet from the extrusion front-end. During extrusion, a failure in the tongue portion of a pressed and sintered solid zirconia nib resulted in considerable damage to support tooling. However, several previous H-shaped TZM extrusions were accomplished in this program with excellent results using solid zirconia die nibs. Extrusion trials with plasma-sprayed zirconia indicated promising results. (Author)

AD-611 610 Div. 26, 30

System Development Corp., Santa Monica, Calif.
PROGRAMMING THE BUREAUCRATIC COMPUTER,
by Beatrice Rome and Sydney Rome. 1964, 18p
Contract AF49 638 1188
AFOSR 65-0295

Unclassified report

Pub. in IEEE Spectrum (U. S.) p72-92 Dec 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Programming (Computers), Management control systems), (*Management control systems, Programming (Computers)), (*Command and control systems, Social communication), Cybernetics, Operations research, Digital computers, Data processing systems, Simulation, Computer logic, Graphics.

A system of logic in communications is evolved for the hierarchy echelons of large corporations, and wherein the digital computer plays vital parts--from executing the command decisions of the C-in-C to the robotlike obedience of a rear-rank private. (Author)

AD-611 774 Div. 26, 8
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
CHEMICAL DEPOSITION AND THE FORMATION OF MIXED FERRITE FILMS,
by William L. Wade, Jr., Thomas Collins, and William J. Skudera, Jr. Dec 64, 16p
Technical rept. no. ECOM-2542
Proj. 1C0 24401A112 04, Task 1C0 24401A112 04 05

Unclassified report

See also AD-282 515.

Descriptors: (*Ferromagnetic materials, Films), (*Metal films, Manufacturing methods), Magnetic properties, Crystal structure, X-ray diffraction analysis, Spinels, Garnet, Electromagnetic properties, Microwave frequency, Alcohols, Solvents, Processing, Nitrates, Yttrium, Aluminum alloys, Yttrium alloys, Manganese, Nickel, Nickel alloys, Zinc alloys, Ferrites.

The report details the chemical preparation processes for formation of three cation spinel ferrite films and garnet ferrite films. Analysis and calculation of the basic chemical solutions are included. Crystal structure and composition are verified by X-ray diffraction analysis. Magnetic properties are evaluated at X-band by cavity-resonance measurements. Experimental data are included. Alcoholic solutions of ferric nitrate and other metal nitrates were combined in necessary proportions to yield stoichiometric ratios of the desired ferrites, which were then deposited on substrates. Firing the coated substrates between 900-1100C in a controlled atmosphere resulted in spinel and garnet ferrite formation. (Author)

AD-611 777 Div. 26, 14
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
NOL FILAMENT WINDING SYSTEM, DESIGN AND OPERATIONAL CHARACTERISTICS,
by Robert W. Eshbaugh. 16 Dec 64, 37p
NOLTR-64-221
Task 732/SP-005

Unclassified report

Descriptors: (*Winding, Filament wound construction), (*Filament wound construction, Composite materials), (*Composite materials, Filament wound construction), (*Machines, Winding), Glass textiles, Reinforcing materials, Plastics, Structural parts, Impregnation, Mandrels, Servomechanisms.

The NOL filament winding system provides a precise, versatile method for fabricating glass filament reinforced plastics structural parts. The winding machine is a chain-driven lathe type; chosen because of the large continuous range of helix angles which can be wound. Inherent in its design is the ability to widely vary and control the full range of winding parameters for engineering research and development purposes. Parts can be wound up to 45.7 cm (18 in.) in diameter with a maximum carriage traverse of 122 cm (48 in.). Experimental items which have been fabricated on this machine include biaxially wound internal pressure vessels, helically wound internal and external pressure vessels, and cones.

AD-611 781 Div. 26, 23, 28

Georgia Inst. of Tech., Atlanta.
MOTIVATION AND EVALUATION OF A STAFF POSITION AS A FUNCTION OF INDUSTRIAL ENGINEERING.
Master's thesis (special problem rept.),
by Allan D. Guggolz. Nov 64, 30p
Contract AF33 608 1003

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Motivation, Industrial psychology), (*Management engineering, Industrial psychology), (*Systems engineering, Performance (Human)), Personnel management, Job analysis, Psychometrics, Analysis.

The objective of the paper is to establish motivation and evaluation as a function of industrial engineering and to show that they can be adequately utilized by industrial engineers to improve performance and efficiency of a staff position.

AD-611 786 Div. 26, 25
CFSTI Prices: HC$3.00 MF$0.75

Texas A and M Univ., College Station.
A STUDY OF SPRING RATES OF DYNAMICALLY LOADED HELICAL SPRINGS.
Master's thesis,
by Franklin Carroll Whitwell. Jan 65, 60p
Contract AF33 608 1120

Unclassified report

Descriptors: (*Helical springs, Loading (Mechanics)), Dynamics, Frequency, Vibration, Harmonic analysis, Oscillographs, Transducers, Galvanometers, Potentiometers, Calibration, Statistical data.

An objective of the research was to observe spring rates of helical compression springs under harmonic loading at other than natural frequencies. It was found that spring rates do not vary with loading frequency if the loading frequency is kept well below the fundamental natural frequency of the spring. The behavior of a spring which had a natural frequency of approximately 120 cycles per second indicated that when it was vibrated at approximately one fourth of natural frequency, its spring rate increased. The wave form of the dynamic forces at this frequency was believed to be caused by surging.

AD-611 787 Div. 26, 15, 30
CFSTI Prices: HC$2.00 MF$0.50

Texas A and M Univ., College Station.
MONTE CARLO TECHNIQUES APPLIED TO PERT NETWORKS.
Master's thesis,
by Lawrence Lee McGowan. Aug 64, 40p
Contract AF33 608 1120

Unclassified report

Descriptors: (*Management control systems, Monte Carlo method), (*Monte Carlo method, Management control systems), (*Management planning, Monte Carlo method), Time studies, Statistical distributions, Factor analysis, Simulation, Networks, Probability, Digital computers.

PERT is an analytical procedure used by management to plan, coordinate and control work projects. PERT has only recently been formalized into a usable system. One of the more important features of PERT is its general applicability for almost all projects. It provides management important decision making information such as expected completion time, a list of possible bottlenecks and where they will occur, and a method of allocating manpower to achieve the best results. PERT can also be adapted easily to computer applications. This thesis will investigate two areas where present procedures are suspected to produce incorrect results. It will first simulate the conditions that would exist if the project were actually accomplished. By comparing two hundred such simulations with the usually derived PERT solution, it will be possible to see what bias exists in the present system. A source of this bias will be investigated in detail to determine just how accurate the PERT solution is and what steps can be taken to improve its results. A second investigation will be undertaken to discover possible effects on the solution through the use of the approximate PERT solution formulas.

AD-611 791 Div. 26, 15, 32
CFSTI Prices: HC$3.00 MF$0.75

Texas Technological Coll., Lubbock. School of Engineering.
AN ANALYTICAL COMPARISON OF SEVERAL STATISTICAL TECHNIQUES FOR THE PREDICTION OF DEMAND.
Master's thesis,
by Edward Louis Uher. May 65, 91p
Contract AF33 608 1119

Unclassified report

Descriptors: (*Inventory analysis, Statistical analysis), (*Statistical analysis, Inventory analysis), Inventory control, Sequential analysis, Stock level control, Quality control, Decision theory, Operations research, Optimization, Management planning.

The purpose of this investigation was to compare three generally accepted statistical decision-making techniques with reference to their applicability to the problem of demand prediction. The three techniques are: (1) a modified Bayesian Decision-Making procedure, (2) a modified C-Chart procedure, and (3) a Sequential Decision procedure which includes the use of the Likelihood-Ratio Test. The investigation was confined to the problem of demand prediction which is an integral part of the over-all problem of provisioning and inventory policies. (Author)

AD-611 793 Div. 26, 17
CFSTI Prices: HC$4.00 MF$1.00

Universal-Cyclops Steel Corp., Bridgeville, Pa. Refractomet Div.
INFAB PROCESSING OF REFRACTORY METALS AND ALLOYS. VOLUME I.
Final rept., vol. 1.
1965, 132p
Contract NOw60 0041c

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.
See also AD-611 794.

Descriptors: (*Hot working, Controlled atmospheres), (*Refractory metals, Hot working), (*Refractory metal alloys, Hot working), Industrial training, Operators (Personnel), Industrial plants, Argon, Purification, Industrial equipment, Rolling mills, Forge presses, Protective clothing, Processing, Powder metallurgy, Forging, Rolling (Metallurgy), Sintering, Molybdenum, Molybdenum alloys, Titanium alloys, Tungsten, Zirconium alloys, Carbon alloys, Niobium, Niobium alloys, Zirconium, Tantalum alloys, Tungsten alloys, Manufacturing methods.

Contents: Training of personnel, develop basic facility operations, translation of operational knowledge to basic metallurgical processes, establish preliminary product and process specifications; Argon purification plant; InRoom equipment operations; Personnel suits; InFab activities, powder metallurgy, forging activities, rolling activities.

AD-611 794 Div. 26, 17
CFSTI Prices: HC$4.00 MF$0.75

Universal-Cyclops Steel Corp., Bridgeville, Pa. Refractomet Div.
INFAB PROCESSING OF REFRACTORY METALS AND ALLOYS VOLUME II.
Final rept., vol. 2.
1965, 103p
Contract NOw60 0041c

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.
See also AD-611 793.

Descriptors: (*Hot working, Controlled atmospheres), (*Refractory metals, Hot working), (*Refractory metal alloys, Hot working), Welding, Heat treatment, Personnel management, Forging, Rolling mills, Specifications, Furnaces, Rolling mills, Industrial plants, Industrial equipment, Processing, Manufacturing methods.

Contents: Upset testing, welding activities, heat treating activities, employee selection and classification, equipment specification and plant layout, outline of process development program for InFab pilot plant, InFab accomplishments and potential, specification for InFab rolling furnace and mill tables.

AD-611 795 Div. 26, 17
CFSTI Prices: HC$5.00 MF$1.00

Universal-Cyclops Steel Corp., Bridgeville, Pa. Refractomet Div.
INFAB PROCESSING OF REFRACTORY METALS AND ALLOYS. VOLUME III. APPENDIX AA.
Final rept., vol. 3.
1965, 158p
Contract NOw60 0041c

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.
See also AD-611 794.

Descriptors: (*Hot working, Controlled atmospheres), (*Argon, Purification), (*Purification, Argon), (*Refractory metals, Hot working), Storage, Gases, Compressors, Catalysis, Oxygen, Driers (apparatus), Pumps, Separation, Nitrogen, Air, Operation, Instruction manuals, Manufacturing methods, Refractory metal alloys.

This volume presents a technical manual to provide complete information concerning Air Products low-temperature processing equipment for the argon purification and recovery system of InFab.

AD-611 796 Div. 26, 17
CFSTI Prices: HC$5.00 MF$1.00

Universal-Cyclops Steel Corp., Bridgeville, Pa. Refractomet Div.
INFAB PROCESSING OF REFRACTORY METALS AND ALLOYS. VOLUME IV. APPENDIX AA (cont'd).
Final rept., vol. 4.
1965, 177p
Contract NOw60 0041c

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.
See also AD-611 795.

Descriptors: (*Hot working, Controlled atmospheres), (*Argon, Purification), (*Purification, Argon), (*Refractory metals, Hot working), Refrigeration systems, Valves, Control systems, Instrumentation, Operation, Maintenance, Instruction manuals, Manufacturing methods, Refractory metal alloys.

This volume is a continuation of the technical manual (AD-611 795) to provide complete information concerning Air Products low temperature processing equipment for the argon purification and recovery system of InFab. A description and operation of the high-and low-level refrigeration systems, index of valves controls and instruments, plant operation and maintenance is presented.

AD-611 797 Div. 26, 17

Universal-Cyclops Steel Corp., Bridgeville, Pa. Refractomet Div.
INFAB PROCESSING OF REFRACTORY METALS AND ALLOYS. VOLUME V, APPENDIX AB.
Final rept., vol. 5.
1965, 124p
Contract NOw60 0041c

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.
See also AD-611 796.

Descriptors: (*Hot working, Controlled atmospheres), (*Industrial plants, Specifications), (*Refractory metals, Hot working), Industrial equipment, Helium, Refractory metal alloys, Manufacturing methods.

This volume presents the specifications for the InFab facility.

AD-611 798 Div. 26, 17

Universal-Cyclops Steel Corp., Bridgeville, Pa. Refractomet Div.
INFAB PROCESSING OF REFRACTORY METALS AND ALLOYS. VOLUME VI. APPENDIX AB(CONT'D).
Final rept., vol. 6.
1965, 121p
Contract NOw60 0041c

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.
See also AD-611 797.

Descriptors: (*Refractory metals, Hot working), (*Hot working, Controlled atmospheres), (*Industrial plants, Specifications), Industrial equipment, Refractory metal alloys, Manufacturing methods.

This volume is a continuation of the specifications (AD-611 797) for the InFab facility.

AD-611 821 Div. 26, 17
CFSTI Prices: HC$1.00 MF$0.50

IIT Research Inst., Chicago, Ill.
INTERFACE FRICTION IN HOT METAL DEFORMATION.
Bimonthly progress rept. no. 4, 24 Nov 64-23 Jan 65, by J. A. Schey. 23 Feb 65, 10p Rept. no. IITRI-B6027-4
Contract NOw64 0458f

Unclassified report

Descriptors: (*Metals, Surface properties), (*Hot working, Metals), (*Friction, Hot working), Deformation, Compressive properties, Dies, Tungsten compounds, Carbides, Aluminum alloys, Titanium alloys, Vanadium alloys, Lubrication, Cobalt alloy.

An investigation of frictional phenomena encountered at the tool-workpiece interface during the hot deformation processing of metals. Progress reported concerns 7075 Al and 6Al-4V-Ti with WC (10% Co) anvils.

AD-611 835 Div. 26, 8
CFSTI Prices: HC$5.00 MF$1.25

General Electric Co., Auburn, N. Y. Semiconductor Products Dept.
QUALITY CONTROL MANUAL, VOLUME II.
22 May 64, 179p

Contract DA36 039AMC03619E

Unclassified report

Descriptors: (*Quality control, Rectifiers), (*Rectifiers, Quality control), Semiconductor devices, Silicon, Specifications, Production control, Management planning, Manufacturing methods, Packaging, Reliability (Electronics).

This quality manual was compiled to describe the quality control procedures currently in effect within the rectifier components department of the General Electric Company.

AD-611 837 Div. 26, 17
CFSTI Prices: HC$1.00 MF$0.50

Battersea Coll. of Tech., London (England).
USE OF REACTIVE ATMOSPHERES FOR THE TREATMENT OF B.C.C. METALS.
Quarterly engineering progress repts. nos. 8 and 9, 1 Jul-31 Dec 64,
by I. J. Toth. 31 Dec 64, 4p
Contract N62558 3591

Unclassified report

See also AD-432 903.

Descriptors: (*Tungsten, Sintering), (*Power metallurgy, Controlled atmospheres), Powder metals, Hydrogen, Bromine, Density, High temperature research, Test equipment, Tests, Transition temperature, Ductility, Brittleness, Nickel, Palladium, Copper, Impregnation, Deformation, Compressive properties, Fracture (Mechanics), Great Britain.

Tungsten test-pieces were sintered, both in hydrogen and hydrogen plus bromine atmospheres, using H.F. heating. The test-pieces were subjected to hot bend tests, hot compression tests, and tests in sealed tubes. The tentative conclusions are reported.

AD-611 846 Div. 26, 17
CFSTI Prices: HC$2.00 MF$0.50

Defense Metals Information Center, Columbus, Ohio.
MACHINING OF TITANIUM ALLOYS,
by Carl T. Olofson, Arnold F. Gerds, Francis W. Boulger, and John A. Gurklis. 2 Feb 65, 30p
Rept. no. DMIC-M-199
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Titanium alloys, Machining), (*Machining, Titanium alloys), Material removal, Cutting fluids, Cutting tools, Machine tools.

The memorandum summarizes current knowledge concerning the machining of titanium alloys. The memorandum deals with the following conventional machining operations: milling, face milling, peripheral milling, turning, boring, drilling, tapping, and grinding. The last section of the memorandum deals with chemical milling operations.

AD-612 042 Div. 26, 14, 17, 30
CFSTI Prices: HC$4.00 MF$0.75

Army Materials Research Agency, Watertown, Mass.
A REPORT GUIDE TO GAMMA RADIOGRAPHIC LITERATURE.
Monograph series,
by Ernest H. Rodgers and Satrak der Boghosian. Aug 64, 102p Rept. no. AMRA-MS-64-11

Unclassified report

Descriptors: (*Radiography, Bibliographies), (*Non-destructive testing, Bibliographies), (*Bibliographies, Radiography), (*Materials, Non-destructive testing), Reports, Abstracting, Indexes, Army research, Gamma rays, Quality control, Metals, X rays, Radioactive isotopes, Test methods, Test equipment.

This guide consists of a bibliography of items currently in the AMRA Nondestructive Testing Information Retrieval System covering the subject of Gamma Radiography. Where available, each item in this journal consists of the following information: (1) item, report, or article title; (2) author or authors; (3) source or facility; (4) report number or identification; (5) date; and (6) abstract. Word descriptors pertinent to each item are listed in alphabetical order and are cross-referenced by the AMRA identification number. Also provided is an author index or, if no author is available, then the issuing organization is listed.

AD-612 043 Div. 26, 14, 17, 30
CFSTI Prices: HC$2.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
A REPORT GUIDE TO THERMAL TESTING LITERATURE.
Monograph series,
by Charles P. Merhib and Ernest H. Rodgers. Aug 64, 47p Rept. no. AMRA-MS-64-14

Unclassified report

Descriptors: (*Non-destructive testing, Bibliographies), (*Materials, Non-destructive testing), (*Bibliographies, Non-destructive testing), Temperature, Reports, Abstracting, Indexes, Army research, Infrared radiation, Ultrasonic radiation, Temperature sensitive elements, Metals, Thermal properties, Test methods, Test equipment.

This guide consists of a bibliography of items currently in the AMRA Nondestructive Testing Information Retrieval System covering the subject of thermal testing. Where available, each item in this journal consists of the following information: (1) item, report, or article title; (2) author or authors; (3) source or facility; (4) report number or identification; (5) date; and (6) abstract. Word descriptors pertinent to each item are listed in alphabetical order and are cross-referenced by the AMRA identification number. Also provided is an author index or, if no author is available, then the issuing organization is listed.

AD-612 044 Div. 26, 14, 17, 30
CFSTI Prices: HC$3.00 MF$0.75

Army Materials Research Agency, Watertown, Mass.
A REPORT GUIDE TO LIQUID PENETRANT LITERATURE.
Monograph series,
by Ernest H. Rodgers and Charles P. Merhib. Aug 64, 56p Rept. no. AMRA-MS-64-12

Unclassified report

Descriptors: (*Non-destructive testing, Bibliographies), (*Bibliographies, Non-destructive testing), (*Materials, Non-destructive testing), Liquids, Penetration, Reports, Abstracting, Indexes, Army research, Metals, Dyes, Test equipment, Test methods, Magnetic properties, Ultrasonic radiation.

This guide consists of a bibliography of items currently in the AMRA Nondestructive Testing Information Retrieval System covering the subject of liquid penetrants. Where available, each item in this journal consists of the following information: (1) item report, or article title; (2) author or authors; (3) source or facility; (4) report number or identification; (5) date; and (6) abstract. Word descriptors pertinent to each item are listed in alphabetical order and are cross-referenced by the AMRA identification number. Also provided is an author index or, if no author is available, then the issuing organization is listed.

AD-612 045 Div. 26, 14, 17, 30
CFSTI Prices: HC$2.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
A REPORT GUIDE TO LITERATURE IN THE FIELDS OF FLUOROSCOPY AND REMOTE WIEWING TECHNIQUES.
Monograph series,
by Charles P. Merhib and Satrak Der Boghosian. Aug 64, 43p Rept. no. AMRA-MS-64-13

Unclassified report

Descriptors: (*Non-destructive testing, Bibliographies), (*Bibliographies, Non-destructive testing), (*Materials, Non-destructive testing), (*Fluoroscopes, Non-destructive testing), Reports, Abstracting, Indexes, Army research, Radiography, Metals, Test methods, Test equipment, Image tubes.

This guide consists of a bibliography of items currently in the AMRA Nondestructive Testing Information Retrieval System covering the subject of fluoroscopy and remote viewing techniques. Where available, each item in this journal consists of the following information: (1) item, report or article title; (2) author or authors; (3) source or facility; (4) report number or identification; (5) date; and (6) abstract. Word descriptors pertinent to each item are listed in alphabetical order and are cross-referenced by the AMRA identification number. Also provided is an author index or, if no author is available, then the issuing organization is listed.

AD-612 047 Div. 26, 14, 17, 30
CFSTI Prices: HC$2.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
A REPORT GUIDE TO AUTORADIOGRAPHIC AND MICRO-RADIOGRAPHIC LITERATURE.
Monograph series,
by Ernest H. Rodgers. Aug 64, 32p
Rept. no. AMRA MS-64-10

Unclassified report

Descriptors: (*Non-destructive testing, Bibliographies), (*Bibliographies, Non-destructive testing), (*Materials, Non-destructive testing), (*Radiography, Non-destructive testing), Autoradiography, Reports, Abstracting, Indexes, Army research, Metals, Radioactive isotopes, Metallography, Test methods, Test equipment.

This guide consists of a bibliography of items currently in the AMRA Nondestructive Testing Information Retrieval System covering the subjects of Autoradiography and Micro-radiography. Where available, each item in this journal consists of the following information: (1) item report, or article title, (2) author or authors, (3) source or facility, (4) report number or identification, (5) date, and (6) abstract. Word descriptors pertinent to each item are listed in alphabetical order and are cross-referenced by the AMRA identification number. Also provided is an author index or, if no author is available, then the issuing organization is listed.

AD-612 080 Div. 26, 30, 32
CFSTI Prices: HC$2.00 MF$0.50

Air Force Office of Scientific Research, Washington, D. C.
MANAGEMENT ASPECTS OF THE AFOSR MANAGEMENT CONTROL DATA SYSTEM 'SOFTWARE'.
Scientific summary rept.,
by Donald R. Currier. 1 Mar 65, 45p
Rept. no. AFOSR-65-0272

Unclassified report

Descriptors: (*Management control systems, Data), (*Personnel management, Management control systems), (*Research program administration, Personnel management), Decision making, Documentation, Data processing systems, Standardization, Scientific research, Communication theory, Computers, Systems engineering, Design, Air Force.

The development of the AFOSR Management Control Data System input software is discussed. The vital relationship of this input software in the concept of the total system is stressed. The nature of MCDS input, the input/output data relationships and the significance of the data transition points are defined. Ten Commandments of input data handling necessary to provide accurate, reliable, and timely output from the data store are presented. The application of behaviorism and communication theory to the handling of input software are described and related to the design of forms, methods, and procedures used by AFOSR to generate, record, process, and control the flow of input data to the data store of the MCDS. (Author)

AD-612 116 Div. 26, 8
CFSTI Prices: HC$1.00 MF$0.50

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
ELECTRON BEAM TECHNIQUES FOR FABRICATION AND ASSEMBLY OF PARTS FOR ELECTRON TUBES.
Quarterly rept. no. 5, 1 Jul-30 Sep 64,
by J. F. Dudenhoefer. 30 Sep 64, 18p Rept. no. EBR-156
Contract DA36 039AMC03625E

Unclassified report

See also AD-608 556.

Descriptors: (*Welding, Electron beams), (*Machining, Electron beams), (*Electron beams, Manufacturing methods), Electron tubes, Electron tube parts, Tests, Acceptability.

Six engineering sample tubes (four 6914A and two 6544 tubes) were successfully fabricated using the electron beam welding facility which has been established. Five preproduction tubes (four 6914A and one 6544) were successfully fabricated using the electron beam welding facility and partially tested on the approved testing facilities. For fabrication of tubes with internal photosensitive surfaces, it is necessary to prevent contamination of the photo surfaces due to oil backstreaming from the oil diffusion pump of the electron beam facility; this was accomplished by installation of a liquid nitrogen baffle on the diffusion pump.

AD-612 255 Div. 26, 17
CFSTI Prices: HC$1.00 MF$0.50

General Electric Research Lab., Schenectady, N. Y.

INVESTIGATION OF THE NATURE OF STRUCTURAL DAMAGE IN METAL-FORMING PROCESSES.
Quarterly rept. no. 1, 19 Oct 64-18 Jan 65,
by H. C. Rogers, R. C. Leech, and L. F. Coffin, Jr.
Feb 65, 13p
Contract NOw65 0097f

Unclassified report

See also AD-603 404.

Descriptors: (*Metals, Material forming), (*Material forming, Metals), Copper, Aluminum alloys, Drawing (Machine processing), Sheets, Stresses, Dies, Lubrication, Friction, Laboratory equipment, Lubricants, Density, Hydrostatic pressure, Structures, Damage.

Progress is reported on an investigation to acquire an understanding of the way in which hydrostatic stresses influence the initiation and propagation of failure in materials to be able to relate the degree of damage in a particular material to the amount of deformation under a particular state of stress, to categorize materials as to their susceptibility to damage under a particular set of processing conditions, and to predict for any process those conditions which will lead to the development of the most favorable states of hydrostatic stress and which will produce the minimum amount of damage to the material being processed. Work has been performed in the following areas: (1) Development of high-pressure fluid facilities; (2) Development of high precision density measuring facilities; (3) Ambient pressure sheet drawing; (4) Lubrication and die friction studies.

AD-612 270 Div. 26, 17
CFSTI Prices: HC$1.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
CYCLIC SINTERING OF METALS.
Technical research article,
by Robert A. Powell. 29 Apr 64, 12p
Rept. no. A64-28
Proj. 1H024401A111

Unclassified report

Presented at the Conference of Metal Powder Industries Federation (20th) and published in the '20th Conference Proceedings,' p139-44.

Descriptors: (*Sintering, Powder metallurgy), (*Powder metallurgy, Sintering), Powder metals, Iron, Cobalt, Titanium, Density, Transition temperature, Tensile properties.

A recent publication indicated that a thermal cyclic sintering treatment for titanium compacts greatly increased the final density. This observation was made in the course of experiments involving dilatometric measurements made during the thermal cycling of compacts of nickel, copper, titanium, and molybdenum powders. It was believed that the improved densification was a result of thermal cycling above the below the transformation temperature (1607F) for titanium. To substantiate this hypothesis, experimentation was conducted on metals which exhibit allotropic transformation; titanium, iron, and cobalt were selected as the model materials. Comparisons are made in the properties achieved through isothermal and thermal cycling sintering treatments. This study substantiated reported results; however, thermal cycling above and below the transformation temperatures provided no improvements in properties nor engineering advantages over conventional isothermal sintering. (Author)

AD-612 343 Div. 26, 17

Northwestern Univ., Evanston, Ill.
THE INFLUENCE OF THE TEMPERATURE OF DEFORMATION ON STRAIN AGING OF ALPHA-IRON,
by E. Lautenschlager and J. O. Brittain. 13 Mar 61, 6p
Contract AF49 638 780
AFOSR 3577

Unclassified report

Pub. in Metallurgical Society of AIME. Transactions (U. S.) v224 p49-53 Feb 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Iron, Aging (Materials)), (*Aging (Materials), Iron), (*Deformation, Temperature), Strain (Mechanics), Dynamics, Internal friction, Heat treatment, Tensile properties, Temperature.

The results show that strain aging occurs in three stages. During the first stage there is small, almost immediate return of the yield point. The solute carbon concentration, as mesured by internal friction, remains constant in stage I but is lower than the concentration in the unstrained condition. In the second stage, the solute concentration decreases while the magnitude of the yield point increases. In the third stage, the solute atoms continue to drain from the solution, the yield point approaches a maximum, and the strain-hardening coefficient and flow curve increase. The kinetics of the strain aging reaction are not the same for the two sets of measurements since the internal friction results lag behind the yield-point measurements. However, the strain-aging kinetics measured at 44 and 64C showed no effect due to the difference in initial deformation temperature; nor were the strain aging kinetics influenced by low-temperature anneals at 77, 195, and 273 K. (Author)

AD-612 353 Div. 26

Syracuse Univ., New York.
MAKING SMALL IRON SPHERES BY MELTING IRON POWDER,
by R. Stover and J. W. Trischka. 27 Mar 62, 1p
Grant AF AFOSR60 23
AFOSR 3404

Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v33 16 p694 Jun 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Powder metallurgy, Iron), (*Iron, Spheres), Powder metals, Powders, Melting, Aluminum compounds, Oxides, Calcium compounds, Surface properties, Particle size.

The spheres were made by placing a mixture of 100 mesh Fe powder and powdered Al2O3(ignited powder) in a hole bored in a graphite rod. An induction furnace, through which H2 gas flowed, was used to obtain the required temperature. Not all, but most spheres were free from surface imperfections, which could be detected with a microscope if they were 0.2% of the diameter. Microscope measurement of sphere diameters showed no variations within the accuracy of our measurements, about one percent. The above method is, of course, useful only if a small number of spheres of a certain approximate size are needed. The spheres which were made had diameters mostly in the range from 0.0025 to 0.0045 in.

AD-612 367 Div. 26, 17
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

PRODUCTION OF LARGE TITANIUM ALLOY FORGINGS,
by B. S. Bulgakov. 12 Jan 65, 49p
FTD-MT-64-474
TT 65-61809

Unclassified report

Edited machine trans. of mono. Kovka Krupnykh Pokovok iz Titanovogo Splava, Leningrad, 1963, 38p.

Descriptors: (*Titanium alloys, Forging), (*Forging, Titanium alloys), USSR, Crystal structure, Aluminum alloys, Mechanical properties, Forge presses, Heat treatment, Production, Processing, Dies, Friction, Surface properties, Deformation.

Contents: Basic properties of titanium alloy in comparison with steel; Equipment for forging and initial ingots; Groups of produced forgings; Development of process of heating before forging; Development of the operation of forging; On the influence of form and state of working surface of tool; The experience of application of special blocks; Concerning tests for mechanical properties; Peculiarities of preparation and organization of production.

27. Propulsion Systems

AD-611 744 Div. 27, 1
CFSTI Prices: HC$2.00 MF$0.50

Systems Research and Development Service, Federal Aviation Agency, Washington, D. C.
TESTS OF PRATT AND WHITNEY MODEL YTF33-P-1 TURBOFAN ENGINE CHARACTERISTICS DURING BIRD INGESTION.
Final rept.,
by Donald M. Millar. Jan 65, 27p
Proj. 520 004 04X
FAA ADS-30

Unclassified report

Descriptors: (*Turbofan engines, Damage), Birds, Performance (Engineering), Tests, Rotor blades (Turbomachinery), Contamination, Hazards, Axial-flow compressors.

Various quantities of birds were propelled into the engine inlet at velocities on the order of 125 knots by a compressed air gun. An abrupt fluctuation in engine performance was sustained in all tests conducted with subsequent engine recovery and stabilization being attained in periods ranging from approximately 1 to 3 seconds. Residual contamination of the engine resulted in some decrease in overall engine efficiency; however, preingestion power levels could be regained through a minor increase in fuel flow. Large quantities of bird remains were discharged from the fan ducts during each ingestion run regardless of the bird-impact point(s) relative to the engine horizontal axis. This action was attributed to the centrifuging action of the fan section which indicated that a forward-fan configuration would tend to minimize adverse engine/compressor contamination effects induced during a bird-ingestion incident. Substantial damage was incurred by the first-stage fan rotor blades in the course of the program. Although this damage did not impair or prevent continued engine operation, the occurrence of such damage in service would require repair prior to continued flight operation.

AD-611 872 Div. 27, 12
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THERE WILL BE NO PHOTON ROCKET,
by V. Smilga. 25 Feb 65, 13p FTD-TT-64-690
TT 65-61791

Unclassified report

Unedited rough draft trans. of Znanie Sila (USSR) 1960, v. 35, no. 7, p. 31-33.

Descriptors: (*Space flight, Feasibility Studies), (*Photons, Space propulsion), (*Space propulsion, Photons), Rocket propulsion, Spacecraft, Manned spacecraft, USSR, Spacecraft nuclear propulsion.

The problems facing interstellar flight powered by any known means are evaluated. It is concluded that nuclear powered flight at either relativistic or subrelativistic velocities is impractical, and that interstellar flight awaits the discovery of some as yet unknown force.

AD-612 018 Div. 27, 4, 9
CFSTI Prices: HC$3.00 MF$0.75

General Dynamics/Astronautics, San Diego, Calif.
THE FAR FIELD OF A ROCKET EXHAUST JET AT LOW AND MODERATE ALTITUDES,
by Frederick P. Boynton. Dec 64, 55p
Rept. nos. GDA-DBE64-067, SR-1
Contract AF19 628 4360, Proj. 8662, ARPA Order 363
AFCRL 65-66

Unclassified report

Descriptors: (*Exhaust gases, Rockets), (*Jet mixing flow, Exhaust gases), Turbulence, Fluid mechanics, Chemical reactions, Mathematical prediction, Programming (Computers), Boundary value problems, Combustion, Atmosphere, Jets.

A method is given for predicting the flow field of a rocket exhaust plume at distances far removed from the nozzle exit at altitudes where afterburning of the exhaust is appreciable. The calculation combines a fluid mechanical analysis of turbulent mixing due to Libby with the adiabatic flame temperature calculation of Boynton and Neu. The eddy viscosity is determined from a consideration of conditions under which compressible turbulent flows appear to exhibit self-preserving behavior. Instructions are given for preparing input to two computer programs which are based on the analysis in the report. In two appendices, it is shown how the eddy viscosity constants may be derived from incompressible jet flow data and a comparison of the results of the present calculation with experimental wind-tunnel rocket exhaust behavior is given. (Author)

AD-612 175 Div. 27, 12, 25
CFSTI Prices: HC$2.00 MF$0.50

Astro-Electronics Div., Radio Corp. of America, Princeton, N. J.
ELECTRON CYCLOTRON RESONANCE PLASMA ACCELERATOR.
Final technical rept. for 1 Jan-31 Dec 64,
by H. Hendel and T. Faith. 31 Jan 65, 33p
Rept. no. AED-R-2640
Contract AF49 638 1342
AFOSR 65-0430

Unclassified report

Descriptors: (*Plasma medium, Acceleration), (*Plasma engines, Cyclotron resonance phenomena), (*Cyclotron resonance phenomena, Plasma engines), Space propulsion, Spacecraft, Magnetic fields, Plasma sheath, Microwaves, Particle accelerators, Electron beams, Ions, Electrons, Energy, Waveguides.

Results are presented for a continuously operating electron cyclotron resonance plasma accelerator at a frequency of 2.45 kMc and absorbed power levels of up to 0.5 kilowatt. Langmuir probe measurements indicate that a space charge field set up by energetic electrons (electron temperature approximately 15 electron-volts) accelerates plasma ions to energies of from 35 to 150 electron-volts. Langmuir probe plasma potential measurements were made adjacent to the analyzer and the effects of ion acceleration in the plasma beam-analyzer sheath were subtracted from the ion energy measurements. The final ion energy shows a linear relationship to the electron temperature in agreement with the theory. At a power of 0.5 kilowatt, due apparently to strong excitation in the magnetic bottle region, electrons from this region are connected by the magnetic field lines to the waveguide walls and losses for bottle configurations of the magnetic field were found to be high (efficiency of 4 percent). Constant-magnetic-field experiments indicate that efficiencies with magnetic bottle field should be at least as high as 30 percent if the accelerator is designed to exclude all field-line connections between wall and plasma. The specific impulse, efficiency, and thrust attainable from a thruster based on electron cyclotron resonance are in the useful range for space propulsion

applications, especially in orbit corrective missions. (Author)

AD-612 287 Div. 27; 12
CFSTI Prices: HC$2.00 MF$0.50

Gas Dynamics Lab., Princeton Univ., N. J.
PARTICLE IMPINGEMENT ON A NOZZLE WALL,
by Sin-I Cheng and Y. Rimon. Jul 64, 36p
Rept. no. 696
Contract AF49 638 1271
AFOSR 64-1659

Unclassified report

Prepared in cooperation with Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md., Contract NOrd16640.

Descriptors: (*Rocket motor nozzles, Nozzle gas flow), (*Particles, Transport properties), Momentum, Thrust, Heat transfer, Thermodynamics, Turbulent boundary layer, Fluid flow, Oxides, Drops, Motion, Numerical analysis, Differential equations, Perturbation theory.

The percentage of the mass flux of fine particles carried in a two phase fluid that impinge on the wall of the convergent section of a nozzle is investigated. If the particles are uniformly distributed over the nozzle entrance and if the diameter of the particles is less than 5 microns, the particles in the turbulent core outside the displacement area of the turbulent boundary layer on the wall of the rocket chamber will pass through. The percentage of particle mass flux that impinges on the nozzle wall is very small. Most of the impingement takes place in the entrance region, where the heat transfer condition is not so severe as is in the throat region. The percentage mass flux of particle impingement is insensitive to nozzle shape near the throat but depends heavily on the nozzle geometry near the entrance. For the same nozzle geometry and particle concentration, the amount of impingement is directly proportional to the particle diameter squared. Increase in the convergence angle of the nozzle causes an increase in the percentage of the impingement.

28. Psychology and Huma Engineering

AD-611 542 Div. 28
CFSTI Prices: HC$1.00 MF$0.50

System Research Ltd., Richmond (England).
A TYPICAL ADAPTIVELY CONTROLLED EXPERIMENT IN PERCEPTUAL DISCRIMINATION,
by Gordon Pask, B. N. Lewis, and D. Watts.
Nov 64, 9p
Contract AF61 052 640
AFOSR 65-0291

Unclassified report

Descriptors: (*Perception (Psychology), Psychometrics), Cybernetics, Bionics, Learning, Reaction (Psychology), Performance (Human), Performance tests, Psychophysiology, Teaching machines, Signals, Light, Control, Time, Great Britain.

The report concerns a demonstration of an adaptively controlled perceptual discrimination experiment. The adaptation rule chosen for demonstration purposes is almost absurdly simple and a rather more elaborate system is used in the main experimental programme. The chief aim is to provide a readily manipulable application of this experimental method and to suggest further applications. This method has been used chiefly in connection with explicit learning experiments or in adaptively controlled teaching. In the present arrangement the learning that occurs is implicit and, in a sense, is an unwanted effect. The adaptive system can be said to compensate for the effects of learning and to approximate a stationary measurement condition. (Author)

AD-611 543 Div. 28, 30

System Research, Ltd., Richmond (England).
RESEARCH ON CYBERNETIC INVESTIGATION OF LEARNING AND PERCEPTION.
Annual summary rept. no. 2, 1 Sep 62-31 Aug 64,
by Gordon Pask. 8 Dec 64, 180p
Contract AF61 052 640
AFOSR 65-0292

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Learning, Cybernetics), (*Memory, Cybernetics), (*Perception (Psychology), Cybernetics), (*Cybernetics, Learning), Bionics, Artificial intelligence, Control systems, Mathematical models, Simulation, Tests, Automatic, Theory, Great Britain.

A number of cybernetic models for learning and memory are discussed. Certain experiments for testing these models are described and some results are presented. The report contains a philosophical discussion, an account of tests for macroscopic hypotheses, a description of evolutionary programmes simulating learning mechanisms and of algorithmic programs used to simulate sequential descriptions of the learning process. (Author)

AD-611 616 Div. 28

Stanford Univ., Calif.
LATENCIES ON LAST ERROR IN PAIRED-ASSOCIATE LEARNING,
by Guy Groen, Patrick Suppes, and Madeleine Schlag-Rey. 1965, 2p
Contract AF49 638 1253; Grant AF AFOSR62 384
AFOSR 65-0289

Unclassified report

Pub. in Psychonomic Science (U. S.) v2 p15-16 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Reaction (Psychology), Psychometrics), (*Learning, Reaction (Psychology)), Errors.

Response latency was measured in a paired-associate experiment with 3 response alternatives and 12 stimulus items. The mean error latency showed a rapid initial increase compared to the mean success latency. Further analysis revelaed that the mean latency on the trial of last error was considerably larger than mean latencies on trials before or after the trial of last error. (Author)

AD-611 669 Div. 28

Electronics Systems Div., Air Force Systems Command, Bedford, Mass.
CONFIDENCE RATINGS AND LEVEL OF PERFORMANCE ON A JUDGMENTAL TASK,
by Raymond S. Nickerson and Charles C. McGldrick, Jr. 10 Dec 64, 6p ESD TDR-64-236

Unclassified report

Pub. in Perceptual and Motor Skills (U. S.) v20 p311-6 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Decision-making, Performance (Human)), (*Attitudes, Psychometrics), Selection, Reaction (Psychology), Correlation techniques.

A 4-alternative forced-choice test was administered to 96 Ss. S's task was to attempt to select the correct alternative from each test item and to indicate his degree of confidence in his choice on a 5-point rating scale. The objective was to compare the confidence assignments of Ss who did relatively well on the primary judgmental task with those of Ss who did poorly. It was found that Ss who performed poorly on the primary task (LP Ss) tended on the average to use lower confidence ratings than Ss who did relatively well (HP Ss). Although few used either high or low ratings exclusively, all Ss tended to use one end of the confidence scale much more frequently than the other. However, whereas HP Ss were fairly consistent in using the high end of the scale, LP Ss were about evenly divided between those using the high end and those using the low. For both groups, performance tended to be monotonically related to expressed confidence. In terms of measures dceveloped by Adams and Adams, HP Ss made more 'realistic' confidence judgments than did LP Ss; however, there was no striking difference between groups in terms of differences in performance associated with step increases in expressed confidence. (Author)

AD-611 679 Div. 28

Manitoba Univ., Winnipeg.
BEHAVIORAL CHANGES AFTER PROLONGED PERCEPTUAL DEPRIVATION (NO INTRUSIONS),
by John P. Zubek. 24 Feb 64, 8p
Proj. 9425 08

Unclassified report

Pub. in Perceptual and Motor Skills (U. S.) v18 p413-20 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sensory deprivation, Behavior), (*Behavior, Sensory deprivation), Confined environments, Perception (Psychology), Motor reactions, Visual perception, Auditory perception, Touch.

16 Ss were placed individually in an isolation chamber under a condition of constant, unpatterned light and white noise for 1 week. The severity of the condition was increased through the use of heavy gloves and the elimination of all intrusions during the isolation period. 12 Ss endured isolation for the full week. A battery of perceptual-motor tests was administered before and after the experience and 30 control Ss were also given the same tests and at the same time intervals. Increasing the severity of perceptual deprivation above that of our earlier experiments did not affect the incidence of hallucinations and post-isolation distortions of the perceptual environment. Both phenomena were rare. Brightness discrimination, size constancy, and kinesthetic acuity were not affected. However, the autokinetic effect was impaired while the tactual acuity of the forearm and index finger was increased significantly. (Author)

AD-611 702 Div. 28

Naval Medical Research Inst., Bethesda, Md.
RELATIONSHIP OF EGO IDENTITY TO PSYCHO-SOCIAL EFFECTIVENESS.
Rept. no. 1,
by John E. Rasmussen. 21 Sep 64, 12p
Proj. MR005 12 2601, Task 1

Unclassified report

Pub. in Psychological Reports v15 p815-25 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Social psychology, Personality), (*Personality, Adjustment (Psychology)), Naval personnel, Psychometrics, Behavior, Test construction (Psychology), Correlation techniques.

This study was designed to examine systematically the relationship of Erikson's concept of ego identity to psychosocial effectiveness as actually demonstrated in daily living. Two groups of Navy recruits, one composed of individuals making a highly adequate psychosocial adjustment and the second containing persons demonstrating minimally adequate adjustment, served as Ss. Highly significant differences were obtained on an operational measure of ego identity. Evidence of construct validity was adduced in terms of the predicted relationship of ego identity and a self-concept measure as well as through intercorrelation of subscores on the ego identity instrument. The results lend support both to the value of Erikson's theory in the systematic study of personality and his position that an adequate ego identity is necessary for a person to cope effectively with his social and cultural environment. (Author)

AD-611 725 Div. 28, 16, 25

Naval Medical Research Lab., New London, Conn.
DISCRIMINATION OF COLOR: IV. SENSITIVITY AS A FUNCTION OF SPECTRAL WAVELENGTH, 410 THROUGH 500 Mu.
Rept. no. 37,
by Michael H. Siegel. 2 Jan 64, 5p
Rept. no. 436, vol. 23 no. 18
Proj. MR005 14 1001 1

Unclassified report

Pub. in Optical Society of America. Journal (U. S.) v54 n6 p821-3 Jun 1964 (Copies not available to DDC or Clearinghouse customers).
Preliminary report presented to the September 1963 meeting of the Psychonomic Society, Bryn Mawr, Pennsylvania.

Descriptors: (*Colors, Visual perception), (*Visual perception, Sensitivity), Color vision, Brightness, Monochromatic light, Display systems.

Color discrimination functions for three observers were plotted in the short-wavelength region of the spectrum. The method of constant stimulus differences was used. Comparisons between the present results and earlier results are reported. Sensitivity proved more variable in this region than elsewhere in the Spectrum. (Author)

AD-611 788 Div. 28
CFSTI Prices: HC$4.00 MF$1.00

Texas Technological Coll., Lubbock. School of Engineering.
INVESTIGATION INTO THE EFFECT OF INTERMITTENT NOISE OF CONSTANT PERIODICITY VS. RANDOM PERIODICITY ON THE PERFORMANCE OF AN INDUSTRIAL TASK.
Master's thesis,
by Nevin E. Fornwalt. May 65, 118p
Contract AF33 608 1119

Unclassified report

Descriptors: (*Noise, Industrial psychology), (*Industrial psychology, Noise), Decision making, Sensory mechanisms, Learning, Sex, Errors, Intensity, Aging (Physiology), Performance (Human).

An investigation of the effect of noise of varying periodicity of presentation on the performance of a task involving a sensorimotor factor and a simple decision factor was performed. The following conclusions regarding this experiment were made: The trials main effect was significant in the analyses of all dependent variables, indicating that a considerable amount of learning took place over the duration of the experimental testing. The main effect of sex was significant in all analyses except that of wrong switches. The effect of noise periodicity on the performance of the experimental task was significant in the analysis of wrong switches. Interactions involving noise type indicated that the random noise produced greater deleterious effects on performance than periodic noise, and that both types of intermittent noise had greater adverse effects on performance than continuous noise. Noise intensity did not have a significant main effect in any of the analyses. The 70 db intensity generally produced the most deleterious effects in males; whereas, the 82 db intensity had this effect on females. Findings regarding age indicated that the younger age group's latencies were predominantly in the late category; whereas, those of the older group were evenly divided between the early and late categories.

AD-611 902 Div. 28

Naval Medical Research Lab., New London, Conn.
EFFECT OF SURROUND AND STIMULUS LUMINANCE ON THE DISCRIMINATION OF HUE.
Rept. no. 36,
by Mary M. Connors. 7 Dec 63, 5p
Rept. no. 435, v23-n17
Proj. MR005 14 1001 1 36

Unclassified report

Pub. in Optical Society of America. Journal (U. S.) v54 n5 p693-95 May 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Visual acuity, Colors), (*Colors, Visual perception), (*Color vision, Sensitivity), (*Luminescence, Intensity), Background, Brightness, Monochromatic light, Light, Display systems, Submarines, Ships.

The effects of changes in the luminance of the stimulus and the surround on hue discrimination were experimentally investigated, using the method of constant stimuli. All observations were made at 550 millimicrons; the standard deviation was used as the measure of sensitivity. Surround luminance was found to have no effect on hue discrimination until the surround had three or more times the luminance of the stimulus. As the surround to stimulus ratios increased, the threshold rose sharply. Increase of the stimulus intensity over a range of 1.5 log units from the photopic threshold increased the discrimination threshold by an average of only about 2 millimicrons. (Author)

AD-611 977 Div. 28

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
RESPONSE TIMES FOR 'SAME'-'DIFFERENT' JUDGEMENTS,
by Raymond S. Nickerson. 13 Oct 64, 4p
Rept. no. ESD TDR-64-536
Unclassified report

Pub. in Perceptual and Motor Skills (U.S.) v20 p15-8 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Decision making, Reaction (Psychology)), (*Reaction (Psychology), Time), Visual perception, Language, Verbal behavior, Psychometrics, Cathode ray tube screens.

S's task was to decide as quickly as possible whether the second of two visually presented English consonants was the same as the first. RTs associated with the decision 'same' tended to be shorter than those associated with the decision 'different.' (Author)

AD-611 978 Div. 28

Electronics Systems Div., Air Force Systems Command, Bedford, Mass.
STIMULUS CATEGORIZATION AND RESPONSE TIME,
by Raymond S. Nickerson and Carl E. Feehrer.
20 Mar 64, 9p Rept. no. ESD TDR-62-16
Unclassified report

Pub. in Perceptual and Motor Skills (U.S.) v18 p785-93 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Reaction (Psychology), Time), (*Decision making, Psychometrics), Perception (Psychology), Performance tests, Language, Geometric forms, Colors, Correlation techniques.

Generally, in disjunctive reaction time experiments there is a one-to-one correspondence between the number of stimulus alternatives and the number of response alternatives. Consequently, the roles of stimulus recognition or categorization processes and response choice processes are confounded in the data. Two experiments were conducted in which the stimulus set was mapped onto the response set in a many-to-one-fashion. In each case S's task was to press a key in response to those stimuli designated as 'critical' and to not press the key in response to stimuli designated as 'non-critical.' In the first experiment RT increased monotonically as the number of different stimuli in the critical stimulus category was increased from one to four. In the second experiment RT varied with the number of independent disjunctively combined attributes used to designate the critical category. (Author)

AD-611 979 Div. 28

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
CONFIDENCE, CORRECTNESS, AND DIFFICULTY WITH NON-PSYCHOPHYSICAL COMPARATIVE JUDGMENTS,
by Raymond S. Nickerson and Charles C. McGoldrick, Jr.
27 Jun 63, 9p Rept. no. ESD-TDR-63-324
Unclassified report

Pub. in Perceptual and Motor Skills (U.S.) v17 p159-67 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Achievement tests, Performance (Human)), (*Performance (Human), Decision making), Test construction (Psychology), Psychometrics, Perception (Psychology).

Three 4-alternative forced-choice tests were constructed, representing different levels of difficulty. Individual items on each test consisted of the names of four states and a 5-point confidence rating scale. S's task was to choose the largest state in each item and indicate his degree of confidence in his choice. Although confidence assignments were somewhat higher for relatively easy judgments than for more difficult ones, the difference was not sufficient to keep the relationship between confidence and correctness invariant with respect to the difficulty of the judgmental task. In short, the results indicate that the value of confidence expressions as indicators of the probable correctness of 'intellectual' judgments varies considerably with the difficulty of the judgments involved. (Author)

AD-611 984 Div. 28, 16

Walter Reed Army Inst. of Research, Washington, D. C.
RATE OF INTRACRANIAL SELF-STIMULATION AS A FUNCTION OF REINFORCEMENT MAGNITUDE AND DENSITY,
by Bernard Beer, William Hodos, and T. J. Matthews.
1964, 2p
Unclassified report

Pub. in Psychonomic Science (U. S.) v1 p321-22 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Brain, Stimulation), (*Stimulation, Behavior), Intensity, Thresholds (Physiology), Reaction (Psychology), Learning, Rats.

Rate-intensity functions for rewarding intracranial stimulation (ICS) were compared for a continuous reinforcement schedule (CRF) and several variable interval schedules (VI). The rate of CRF responding declined at the higher intensities of ICS. With relatively longer VI schedules, however, self-stimulation rate increased as a monotonic function of intensity. (Author)

AD-611 999 Div. 28

Massachusetts Univ., Amherst.

COMPOUND NONSENSE-SYLLABLE STIMULI PRESENTED WITHOUT AN INTERVENING SPACE,
by Barbara S. Musgrave, Albert E. Goss, and Elizabeth Shrader. 10 Dec 62, 3p
Contract Nonr269100

Unclassified report

Pub. in Journal of Experimental Psychology (U. S.) v66 n6 p609-11 1963 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Smith Coll., Northampton, Mass.

Descriptors: (*Reaction (Psychology), Time), Psychometrics, Verbal behavior, Analysis of variance, Reflexes.

Musgrave's experiment on transfer of nonsense-syllable responses to a pair of nonsense-syllable elements presented separately to those elements presented simultaneously in Convergent, Associated-Nonassociated, and Divergent compounds was replicated in all essential features but one: the nonsense syllables were presented in compounds with no rather than with one intervening space between elements of the compound. In agreement with Musgrave's results, faster responding occurred under a Continued Singles control than under the Convergent compound. The responses under Associated-Nonassociated and Divergent compounds were successively slower than those under the Convergent compound. (Author)

AD-612 000 Div. 28

Massachusetts Univ., Amherst.
MANIFEST STRENGTHENING OF CORRECT RESPONSES OF PAIRED-ASSOCIATES UNDER POSTCRITERION ZERO PER CENT OCCURRENCE OF RESPONSE MEMBERS,
by Albert E. Goss. 28 Jan 63, 10p
Contract Nonr269100

Unclassified report

Pub. in Journal of General Psychology (U. S.) v72 p135-44 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Reaction (Psychology), Psychometrics), Learning, Reflexes, Analysis of variance.

In two previous experiments, upon attainment of a criterion of seven correct anticipations on one trial or of 15 correct on two successive trials with a list of eight paired associates, response members were removed. In 13 of 16 comparisons, more correct responses occurred during Trials 13-16 under zero per cent occurrence of response members (ORM) than during the criterion trial(s) with response members present. Thus, within the conventional definition of a trial as one complete presentation of a list, correct overt responses within a two-second anticipation interval apparently increased in frequency under zero per cent ORM. The general objective of the present experiment was to confirm and to extend the previous findings with different lists presented by means of a different apparatus. On the assumption of further strengthening of correct overt responses under zero per cent ORM, the specific objective was to assess the pertinence of the criterion achieved before the shift to zero per cent ORM with both an easy and a hard list of four paired associates. These lists were learned under 100 per cent ORM to one of successively more stringent criteria of one correct response of four possible correct responses during a trial, two of four, three of four, or four of four. Thus, the two variables were list difficulty and criteria achieved prior to the shift to zero per cent ORM. (Author)

AD-612 075 Div. 28
CFSTI Prices: HC$1.00 MF$0.50

Hunter Coll. of the City Univ. of New York.
RESPONSE GIVING AND ATTITUDE CHANGE WHEN BOTH SIDES OF AN ISSUE HAVE TO BE SUPPORTED,
by Walter Weiss. Mar 65, 21p
Technical rept. no. TR-2
Contract Nonr430900, Proj. RR006 08 02

Unclassified report

Descriptors: (*Attitudes, Reasoning), (*Social psychology, Attitudes), Recall, Motivation, Public opinion, Psychometrics.

The main purpose of this research was to determine the kinds of reasons Ss consider relevant to the support of both sides of an issue and to compare the reasons given by Ss who approve of the viewpoint being justified with those by Ss who disapprove. Furthermore, requiring people to recall and, thereby, think about opposition arguments may suffice by itself to initiate a cognitive process that increases the likelihood of change, even though they also think of supporting reasons. In general, Ss were asked to give reasons supporting both the pro and con sides of each of two issues. Half did this before they gave their own attitude on the issue, and half after. Also, half gave pro reasons before con reasons on an issue and half did the reverse. The order of the issues was counterbalanced. The schema found most suitable for coding the reasons given by the Ss was that which emphasized the good or bad consequences of policy. However, additional types of categories were also needed. Congruence between S's own attitude and the side being supported was positively related to the number of reasons given and their rated effectiveness in supporting that side. The attitudes of the Ss were not related to the types of reasons given on one issue but were related on the other. The results suggest that giving reasons on both sides of an issue moderates people's attitude on that issue. Hence, it would seem that the countering effect of actively rehearsing arguments supporting one's own position does not suffice to eliminate the influence of reconsidering and making salient opposition arguments at the time of attitude expression. (Author)

AD-612 125 Div. 28
CFSTI Prices: HC$1.00 MF$0.50

Ohio State Univ., Columbus.
THE PREDICTION OF SOCIAL ACTION TAKING BEHAVIOR,
by Pearl Mayo Gore and Julian B. Rotter. 1962, 12p
Contract AF49 638 741
AFOSR 2833

Unclassified report

Presented at the Midwestern Psychological Association Meeting, 1962.

Descriptors: (*Social psychology, Behavior), (*Behavior, Social psychology), (*Attitudes, Social psychology), Students, Motivation, Leadership, Sociometrics, Psychometrics, Group dynamics, Public opinion, Social sciences.

Students in a Southern Negro college (N - 116) very much involved in the current social protest movement against segregation were used as subjects of a study of prediction of social action taking behavior. A forced choice test of a generalized attitude toward internal or external control of reinforcements, not specifically dealing with the issue studied, predicted the type and degree of commitment behavior manifested to effect social change. The social desirability motive and social class showed a

weak trend, in the predicted direction, in the case of the former and a logically consistent one on an ad hoc basis in the case of the latter. These findings may serve as an impetus for much needed research in the important area of ongoing social action and social change.

AD-612 126 Div. 28
CFSTI Prices: HC$2.00 MF$0.50

Ohio State Univ., Columbus.
LEARNING THEORY AND CLINICAL PSYCHOLOGY,
by Shephard Liverant. 1962, 35p
Contract AF49 638 741
AFOSR 2832

Unclassified report

Descriptors: (*Learning, Theory), (*Abnormal psychology, Learning), (*Adjustment (Psychology), Learning), Behavior, Personality, Anxiety, Attitudes, Neuroses, Mental disorders, Perception (Psychology), Verbal behavior, Social psychology, Diagnosis, Therapy.

Four conclusions about the reconciliation of learning theory and clinical psychology are offered. First, both behaviorists and clinical psychologists must overcome their traditional distrust of theory and come to a realization that the development of a constructual approach is to their mutual benefit and advancement. Second, the thrust of learning into clinical psychology has produced much questioning of clinical mythology, a procedure which is a necessary step in the progress of clinical psychology. Third, contact with clinical observation has in many instances forced the learning theorist to reexamine the narrowness of his formulations and has contributed to an awareness that imaginative conceptualization is prior to methodological ingenuity. Fourth, the strands of learning theory form a network of still tenuous strength, but one which offers a compelling approach to abnormal behavior and the clinician's interactions with the disturbed individual. (Author)

AD-612 221 Div. 28, 16

Chile Univ., Santiago.
AN ELECTRICAL CORRELATE TO THE PROCESS OF LEARNING. EXPERIMENTS IN BLATTA ORIENTALIS,
by J. V. Luco and L. C. Aranda. 1964, 4p
Grant AF AFOSR62 387
AFOSR 65-0298

Unclassified report

Pub. in Nature (Gt. Brit.) v201 n4926 p1330-1 Mar 28 1964(Copies available only to DDC users).

Descriptors: (*Blattidae, Learning), (*Learning, Blattidae), (*Motor reactions, Learning), Adaptation physiology), Central nervous system, Sense organs, Ganglia, Neuromuscular transmission, Electricity, Legs, Psychophysiology, Chile.

The report deals with the question of differences between the electrical reaction of the nervous system of normal cockroaches compared with cockroaches forced to learn a new motor performance.

AD-612 326 Div. 28

Communication Research Inst., Miami, Fla.
OPERANT CONDITIONING OF THE BOTTLENOSE DOLPHIN WITH ELECTRICAL STIMULATION OF THE BRAIN,
by J. C. Lilly and A. M. Miller. 19 Jun 61, 7p
Contract Nonr293500; Grant AF AFOSR61 62
AFOSR 2624

Unclassified report

Pub. in Journal of Comparative and Physiological Psychology (U. S.) v55 n1 p73-9 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cetacea, Behavior), (*Learning, Cetacea), Stress (Physiology), Conditioned reflex, Brain, Stimulation, Electrodes, Motor reactions, Psychophysiology, Sound, Monkeys.

It is shown that it is feasible to place electrodes into the large brain of the unanesthetized bottlenose dolphin (Tursiops truncalus). Using roving electrodes, one can demonstrate separate zones of the brain which are positively and negatively reinforcing, i. e., in which 'self-start' and 'self-stop' activity can be elicited. It is shown that the dolphin learns these tasks more rapidly than does the monkey. It is also shown that in a rewarding, or positively reinforcing zone, the animal tends to vocalize in complex and startling ways. It vocalizes when first stimulated in this area or when stimulation is withdrawn after a period of 'self-start' activity. Thus we conclude that the behavior of the bottlenose dolphin differs from that of the monkey in the following respects: Like the monkey, the dolphin uses any available external somatic motor output in order to push switches to stimulate its own brain for a wanted, or positive, or rewarding stimulus or to cut off an unwanted, or negative, or punishing stimulation started by the apparatus. In contrast with the monkey, the dolphin uses its vocal output when this is effective in order to modify the responses obtained from the environment (in terms of brain stimulation). The dolphin can inhibit violent escape behavior caused by 'punishing' brain stimulation; the macaque does not. (Author)

29. Quartermaster Equipment and Supplies

No Entries

30. Research and Research Equipment

AD-611 521 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RAPID ACTION OF STEP-BY-STEP AUTOMATIC SEARCH SYSTEMS SITUATED UNDER THE EFFECT OF INCIDENTAL INTERFERENCES,
by B. A. Besedin and G. A. Medvedev. 15 Feb 65, 16p FTD-TT-64-520
TT 65-61766

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Tekhnicheskaya Kibernetika, 1963, no. 2, p. 70-77.

Descriptors: (*Search theory, Probability), Graphics, Determinants, Algebraic geometry, Control systems, Automatic, Interference, Cybernetics, USSR.

Mean value and time dispersion formulas are derived for the change over of a step-by-step automatic searching system from one state into another when the multitude of possible states of the search system appears to be finite or countable. A comparative analysis is given of two structurally different types of step-by-step automatic search systems which appear to be extreme regulators of the object with lump-linear characteristic. (Author)

AD-611 546 Div. 30
CFSTI Prices: HC$8.35 MF$2.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRONIC ANALOG COMPUTERS AND THEIR APPLICATION FOR INVESTIGATION OF AUTOMATIC CONTROL SYSTEMS, 2D ED.,
by B. Ya. Kogan. 4 Feb 65, 532p FTD-MT-64-115
TT 65-61779

Unclassified report

Edited machine trans. of mono. Elektronnye Modeliruyushchie Ustroistva i Ikh Primenenie dlya Issledovaniya Sistem Avtomaticheskogo Regulirovaniya, 2d ed., Moscow, 1963, 510p.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Analog computers, Control systems), Simulation, Mathematical models, Linear systems, Differential equations, Errors, Direct current, Amplifiers, Computer logic, Diodes, Cathode ray tubes, Numerical methods and procedures, Dynamics, Nonlinear systems, Bibliographies, USSR.

Contents: Electronic analog computers and their elements; Linear computing elements; Error of linear computing elements; Diagrams of d-c operational amplifiers; Diode functional generators; Principles of theory of diode functional generators; Functional generators using cathode-ray tubes; Multipliers and dividers; Principles of construction of d-c electronic analog computers; Method of setting and solving problems; Simulating linearized systems of automatic control; Investigation of dynamics of automatic systems with rational fractional transfer functions; Simulation of nonlinear systems of automatic control; Methods of simulating automatic systems with dynamic range of change of variable, exceeding dynamic range of electronic model; Appendixes: Reproduction of combined linear operations by one operational amplifier; and brief technical characteristics of certain types of d-c electronic analog computers.

AD-611 547 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVICE FOR MEASURING TOTAL AND STATIC PRESSURES IN UNSTEADY GAS-DYNAMIC FLOWS,
by S. Yu. Chernyavskii. 10 Feb 65, 5p
FTD-TT-64-955
TT 65-61780

Unclassified report

Unedited rough draft trans. of Russian patent 159,667, appl. no. 779,951/26-10, 26 May 62.

Descriptors: (*Piezoelectric gages, Gas flow), USSR, Statics, Pressure, Ceramic materials, Design.

The object of the invention is a device for measuring the total and static pressures in unsteady gas-dynamic flows which contains pickups fastened to a forked holder in one of which at the end or face part and in the other in a lateral flow-through piezo elements are located. To increase the dependability of the device and to reduce the temperature errors in measuring in it the piezo elements on the outer side are covered by heat-protection plates with acoustic impedance of the piezo elements. These plates serve at the same time as electrodes of the piezo converters. (Author)

AD-611 554 Div. 30
CFSTI Prices: HC$2.00 MF$0.50

Transducer Information Center, Battelle Memorial Inst., Columbus, Ohio.
QUARTERLY ACCESSION LIST 7.
Rept. for 16 Oct 64-15 Jan 65, 15 Jan 65, 41p TIC-AL-7
Contract AF33 615 1819, Proj. 8222, Task 822203

Unclassified report

Descriptors: (*Test equipment, Abstracting), (*Abstracting, Test equipment), (*Instrumentation, Abstracting), Accelerometers, Acoustic equipment, Hydrophones, Attitude indicators, Flowmeters, Gyroscopes, Pressure gages, Anemometers, Tensiometers, Tachometers, Transducers, Monitors, Magnetometers, Potentiometers, Seismographs, Polymers, Cryogenics, Humidity, Temperature sensitive elements.

Contents:
Acceleration
Acoustic
Attitude
Displacement
Flow
Force
Gyro
Humidity
Level
Magnetic field
Position
Pressure
Rotary speed (rpm)
Strain
Temperature
Vibration

AD-611 566 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

Iowa State Univ., Iowa City.
MAXIMIZATION OF SYSTEM RELIABILITY USING A DIGITAL COMPUTER AND OSCILLOSCOPE SEARCH TECHNIQUE.
Master's thesis,
by Roger K. Hoppe. Jan 65, 83p

Unclassified report

Descriptors: (*Digital computers, Oscilloscopes), (*Search theory, Dynamic programming), (*Redundant components, Search theory), Programming (Computers), Numerical analysis, Partial differential equations, Analog-to-digital converters, Reliability, Iterative methods, Non-linear systems, Display systems, Costs, Weight, Tables.

The purpose of the paper is to devise a systematic method of searching for the optimal Lagrange multiplier through the use of a digital computer in a direct tie with an on-line oscilloscope. The method is a considerable aid in converging on the optimal Lagrange multiplier in a minimum number of iterations. The use of an on-line oscilloscope with the digital computer offers a relatively new method of search; it is felt that the general developments in this paper may also have wide application in other non-linear, search-related problems. (Author)

AD-611 590 Div. 30, 22
CFSTI Prices: HC$2.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
PRESSURE TRANSDUCER FOR MEASURING SHOCK WAVE PROFILES.
Formal rept.,
by D. Bernstein. 15 Jun 62, 40p
Contract DA49 146XZ096, Proj. PGU3713; ARPA Order 172 61

Unclassified report

Descriptors: (*Shock waves, Measurement), (*Piezoelectric transducers, Materials), Pressure gages, Wave analyzers, Electric insulation, Piezoelectric crystals, Electrical properties, Wiring diagrams, Resistance (Electrical), Time, Alloys.

Adequate experimental techniques - electrical and explosive - were developed and used to measure piezoresistance of alloys, electrical properties of insulators, shock impedance of alloys in insulators, time coverage, and rise time. In addition several types of experiments were conducted to confirm that the pressure induced pulses in the transducers are indeed due to a piezoresistive effect. (Author)

AD-611 597 Div. 30, 25

National Research Council of Canada, Ottawa (Ontario). Div. of Applied Physics.
THE UNMATCHED GUARD METHOD OF MEASURING THERMAL CONDUCTIVITY. II. THE GUARDLESS METHOD,
by M. J. Laubitz. 28 Oct 64, 17p Rept. no. NRC-8238

Unclassified report

Pub. in Canadian Journal of Physics v43 p227-43 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Thermal conductivity, Measurement), Instrumentation, Heaters, Cooling, Thermal insulation, Thermocouples, Tests, Effectiveness, Powders, Alloys, Corrections, Canada.

A new system for measuring thermal conductivity at high temperatures is described in detail. The system is based on the Unmatched Guard Method and forms a limiting case of it. The system is easy to assemble and to operate; it has a fast thermal response, and gives results with an uncertainty of only ±2.3%, and an imprecision of ±1.5%. Results obtained with the new system on Inconel 702 agree very well with previous work. (Author)

AD-611 611 Div. 30

Pennsylvania State Univ., University Park. Dept. of Engineering Mechanics.
A LOW-TEMPERATURE FATIGUE TESTING MACHINE.
Technical note,
by M. A. Wilkov and L. E. Murr. 1964, 3p
Grant AF AFOSR165 63
AFOSR 65-0280

Unclassified report

Pub. in Materials Research and Standards (U. S.) v4 n6 p285-7 Jun 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Fatigue (Mechanics), Test equipment), (*Test equipment, Fatigue (Mechanics)), Low-temperature research, Liquids, Machines, Production, Stresses, Strain (Mechanics), Specifications, Operation.

The machine is described as an extremely versatile mechanical system. The strain amplitude is adjustable over a wide range of measurable values, and the oper - ating frequency is independent of the stress amplitude. Specimens can be fatigued in any liquid environment by the direct immersion of the specimen gripping section. A simple double-Dewar cryostat is used to contain a coolant that provides the low-temperature environment. The basic elements of the testing machine are an eccentric electric motor driving unit, a machined stainless-steel body, and a set of adjustable specimen grips.

AD-611 658 Div. 30, 25

Army Electronics Labs., Fort Monmouth, N. J.
INTERFEROMETRIC MEASUREMENTS OF RAPID PHASE CHANGES IN THE VISIBLE AND NEAR IR INFRARED USING A LASER LIGHT SOURCE,
by Rudolf G. Buser and Johann J. Kainz. 9 Mar 64, 5p

Unclassified report

Pub. in Applied Optics (U. S.) v3 p1495-9 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Interferometers, Lasers), (*Lasers, Interferometers), Plasma physics, Measurement, Specta (Visible and Ultraviolet), Specta (Infrared), Phase shift, Photomultipliers, Helium, Neon.

The use of a He-Ne laser as a light source for a Michelson interferometer in connection with plasma measurements is studied. Two different methods of recording are employed and their accuracy is determined. Results indicate that the interferometer, particularly in the infrared, will provide a powerful instrument for determination of plasma properties. (Author)

AD-611 689 Div. 30

Army Electronics Labs., Fort Monmouth, N. J.
LOOKING AHEAD IN SCIENCE AND TECHNOLOGY,
by Harold A. Zahl. 1964, 7p

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Student Journal (U. S.) p17-22 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Scientific personnel, Performance (Human)), (*Engineering personnel, Performance (Human)), Scientific research.

Popular article on opportunities for employment of engineers and scientists. Seven interesting and significant items are listed as having sprung, during the preceding year, from the seeds of research and from engineering application: the optical transistor injection laser; self-lubricating materials from TFE fluorocarbon and tungsten diselenide in copper and silver matrixes; superconducting magnets with fields higher than 65,000 gauss; window glass that can be bent and flexed; graphite cloth or tape that does not deteriorate at 3000 degrees C; and low-temperature fuel cells that operate with a broad range of hydrocarbon fuels.

AD-611 730 Div. 30

Control and Information Systems Lab., Purdue Univ., Lafayette, Ind.
A COMPUTER-SIMULATED ON-LINE EXPERIMENT IN LEARNING CONTROL SYSTEMS,
by J. D. Hill, G. J. McMurtry, and K. S. Fu.
1964, 11p
Grants AF AFOSR62 351, NSF G14609
AFOSR 65-0325

Unclassified report

Pub. in Joint Automatic Control Conference, Stanford Univ., Jun 64. Proceedings P315-25 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Artificial intelligence, Control systems), (*Learning, Artificial intelligence), (*Cybernetics, Artificial intelligence), Adaptive control systems, Pattern recognition, Automata, Simulation, Analog computers, Digital computers, Analog-to-digital converters, Digital-to-analog converters, Computer logic.

The structure of a learning control system combines digital memory and logic circuitry with an adaptive system. Data obtained through adaptation is stored (remembered) and later utilized to improve the system performance. The general learning system operation is outlined in this paper and a simple experimental system which illustrates the improved performance is discussed. The example system is a second order plant in which the damping ratio and undamped natural frequency are considered to be affected by the environment in a piece-wise constant manner. The system was simulated on a GEDA analog computer and the memory and logic functions were supplied by an IBM 1620 through IBM 1711 and 1712 analog to digital and digital to analog equipment.

AD-611 753 Div. 30, 9
CFSTI Prices: HC$3.00 MF$0.75

Mitre Corp., Bedford, Mass.
DESCRIPTION OF THE SYSTEMS DESIGN LABORATORY DISPLAY CONSOLES,
by J. Mitchell. Feb 65, 52p Rept. no. TM-03930
Contract AF19 628 2390, Proj. 250 0
ESD TDR-64-150

Unclassified report

Descriptors: (*Command and control systems, Television display systems), (*Television display systems, Command and control systems), (*Data processing systems, Television display systems), Systems engineering, Cathode ray tubes, Computers, Magnetic core storage, Light communication systems, Photoelectric effect, Graphics, Typewriters, Electronic switches.

Six display consoles were purchased for the Systems Design Laboratory (SDL) to facilitate rapid, accurate communications between the SDL data processing facilities and the display operators. These consoles may be connected to any computer able to control IBM 729 series magnetic tape drives. Each console contains a 2048-word magnetic core memory for storing display data which is coded in a highly efficient manner. It also contains display storage in the form of a 64-frame film strip any frame of which may be presented on the display. Display generation is very rapid and is capable of showing alphanumeric and special characters, straight lines, and points. The appearance of a number of the special characters is under control of the data processor's program. The display operator is provided with switches, a light pencil, and a typewriter able to generate inquiries or statements for entry into the data processor's program. (Author)

AD-611 755 Div. 30, 2
CFSTI Prices: HC$1.00 MF$0.50

Northwestern Univ., Evanston, Ill.
IBM 7090 PROGRAM FOR LOCATING BIVARIATE MEANS AND BIVARIATE MEDIANS,
by David R. Seymour. Feb 65, 23p
Technical rept. no. TR-16
Contract Nonr1228 26, Proj. NR389 135

Unclassified report

Descriptors: (*Programming (Computers), Instruction manuals), (*Statistical analysis, Programming (Computers)), Programming languages, Iterative methods, Geography.

The FORTRAN II program presented here locates two points in a plane. The first is the bivariate analogue of the median, which shares with the median the property of being a center about which the sum of absolute departures is a minimum. An iterative procedure must be used to locate this point. The second point is analogous to the arithmetic mean and is the point from which squared departures is a minimum. The bivariate mean is located by a direct mathematical solution. This report contains: (1) a brief summary of the nature and uses of the bivariate mean and median, (2) the method used to obtain these points, (3) instructions for using the program, including a worked example, and (4) the program listing. (Author)

AD-611 775 Div. 30, 20
CFSTI Prices: HC$3.00 MF$0.75

David Taylor Model Basin, Washington, D. C.
THE FLAME MASTER CONTROL SYSTEM,
by Elizabeth Cuthill, Joanna W. Schot, and Sarah E. Kenady. Jan 65, 93p DTMB-1863
Proj. S R003 10 01

Unclassified report

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Descriptors: (*Digital computers, Compilers), (*Programming (Computers), Reactor theory), (*Reactor theory, Programming (Computers)), Reactor control, Reactor fuels, Consumption, Design.

This report describes the operating system developed for the code-checking and production-running of FLAME, a three-dimensional few-group reactor depletion code for the DTMB UNIVAC-LARC. FLAME is actually a set of

codes designated FLAME 1, FLAME 2, etc., each of which consists of many routines programmed for use in various combinations to solve a variety of steady-state and time-dependent problems arising in the design of nuclear reactors. The program which controls the combining of these routines into a flexible but efficient and practical system is known as the FLAME Master Control System. This system is also useful in processing LARC routines which are not part of the FLAME code. (Author)

AD-611 778 Div. 30, 16
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
PROPOSAL FOR AN ANALOG COCHLEA,
by Frederick E. Warnock. 9 Nov 64, 50p
NOLTR-64-191
Task RREN04012F008 21 02, RUDC3B000F001 10 02
Unclassified report

Descriptors: (*Bionics, Ear), (*Ear, Anatomical models), Sound, Amplifiers, Delay lines, Hearing, Inductance, Capacitors, Analog systems, Signals, Electric filters, Nerve impulses, Audiofrequency, Programming (Computers), Programming languages, Design, Tables.

Using bionic's precept that Nature can suggest better solutions to engineering problems, an electrical ear model was designed for analyzing and classifying complex audio sounds. This lumped constant simulation approximates the transfer of sound energy to a mechanical displacement of the basiar membrance, which is within the inner ear or cochlea. Essentially, this model is a hardware adaption of the model proposed by James L. Flanagan of Bell Laboratories. The model consists of an electrical middle ear simulation, followed by an 'artificial' cochlea. This cochlea consists of a special 201 tap delay line whose taps drive cochlea filters. These cochlea filters drive output amplifiers which have been designed to compensate for losses and drive artificial neurons used for processing the parallel outputs. For building this specific hardware model, the component values, tolerances, and specifications are included, along with considerations on signal level, dynamic range, noise, and power consumption. (Author)

AD-611 780 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

Pittsburgh Univ., Pa.
SYNTHESIS OF FOUR BAR LINKAGE FUNCTION GENERATORS WITH PRECISION FIRST AND SECOND DERIVATIVES.
Master's thesis,
by Max J. Linza. 1964, 89p
Contract AF33 608 955
Unclassified report

Descriptors: (*Machines, Synthesis), (*Motion, Machines), (*Mechanical engineering, Theory), Design, Digital computers, Programming languages, Geometry, Functions.

A four bar linkage can be designed such that its output motion is a function of its input motion. When five pairs of displacement angles are to be included in the design, the starting configuration of the mechanism is completely specified. This means that not only the link sizes are specified but the starting angles of the input and output links are also specified. Previous work in the synthesis of function generators has demonstrated how these starting angles and link sizes can be made compatible with five precision points, which in the physical sense are the five pairs of displacement angles. The previous work is extended to include precision first and second derivatives in the design calculation.

AD-611 807 Div. 30, 29, 31
CFSTI Prices: HC$1.00 MF$0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
UNDERWATER PRESSURE-COMPENSATED BREATHING CONTROL VALVES FOR PROLONGED WATER IMMERSION.
Final rept. for Feb 60-Jun 62,
by Henry W. Seeler. Dec 64, 15p
Rept. no. AMRL-TR-64-130
Proj. 7222
Unclassified report

Descriptors: (*Breathing apparatus, Underwater equipment), Breathing masks, Respiration, Protective clothing, Pressure breathings, Pressure regulators, Design, Compressed air, Tests, Valves, Weightlessness, Simulation, Gas analysis.

Two water-pressure-compensated breathing devices for prolonged immersion have been designed, fabricated, and tested underwater. One valve is a continuous-flow regulator and the other is a demand regulator. Both valves allow exhalation through a hose directly into the surface atmosphere for air analysis. One of the two valves has been used extensively during prolonged weightlessness simulation tests by immersion. (Author)

AD-611 815 Div. 30, 15
CFSTI Prices: HC$3.00 MF$0.75

IIT Research Inst., Chicago, Ill.
THEOREM-PROVING BY COMPUTER.
Final rept. for 1 Jan-31 Dec 64,
by B. Kallick. 31 Jan 65, 68p
Rept. no. IITRI-H6008-5
Contract AF49 638 1349, Proj. H6008
AFOSR 65-0338
Unclassified report

Descriptors: (*Mathematical logic, Theorems), (*Computers, Mathematical logic), Search theory, Decision theory, Metamathematics, Number theory, Prime numbers, Programming (Computers).

The subject is the development of efficient theorem-proving algorithms, amenable to computer implementation, through the application of the theory of mathematical logic. The approach taken is via the Herbrand theorem and consists in expressing the theorem as the negation of a prefix formula of predicate calculus and of finding an inconsistent set of instances of this formula. The following problem is dealt with: in searching for an inconsistent set of instances and having already generated certain instances of a formula, how can the information in the matrix of the formula be utilized to determine the most appropriate way of generating the next instance. In this regard, the idea of expressing the matrix in disjunctive normal form and generating instances so as to construct inconsistent sub-paths is considered to be a useful technique and worthy of continued study. A partial solution to the following problem is also obtained: how can the information that a given disjunctive term of the matrix has figured in an inconsistent sub-path be utilized to avoid the repetition of identical computation the next time that term is encountered. A proof procedure is described which is capable of deciding certain known solvable subcases of the decision problem. It is conjectured that the procedure yield a new solvable subcase. (Author)

AD-611 827 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

Technical Military Planning Operation, General Electric Co., Santa Barbara, Calif.
LAP-LIST ASSEMBLY PROGRAMMING SYSTEM.
Research memo.,
by John W. Gwynn. Jun 64, 77p Rept. no. RM64TMP-13
Unclassified report

Descriptors: (*Programming languages, Programming (Computers)), (*Programming (Computers), Programming languages), Computers, Data processing systems, Computer storage devices.

LAP consists of four functional packages which are computer programs that run on the computer to allow execution of programs written in the LAP language. First, the LAP assembly program will process a source program to produce an object program for a nonexistent list-processing machine. Second, the LAP processor simulates the missing hardware and allows the program to be executed on the existing computer. Third, the machine language assembly program assembles those subprograms written in the language of the existing hardware. Fourth, the LAP controlling tape system is the overall 'master control' to the other functions. The system is capable of executive control over a program consisting of list manipulative macro-instructions and perhaps some subprograms consisting of machine language instructions. These four functional, related pieces of the LAP system 'marry' the language to the computer producing a 'LAP machine'. This machine is ready to aid the researcher in his work.

AD-611 841 Div. 30
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
LIPL: LINEAR INFORMATION PROCESSING LANGUAGE,
by Robert Dupchak. Feb 65, 65p Rept. no. RM-4320-PR
Contract AF49 638 700
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Programming languages, Control sequences), (*Data processing systems, Programming languages), Compilers, Linear systems.

This memorandum is a supplement to the 'Information Processing Language-V Manual,' detailing a new alternate format in which (Information Processing Language) routines and data can be represented. Specifically, LIPL (Linear IPL) is a horizontal, linear, parenthesis format. This memorandum also describes a new IPL Basic Process, J164, for in-process loading of LIPL routines and data. J164 has been coded as an IPL routine, and, therefore, can be used on any IPL computer. A description and listing of this routine is included; card or tape copies of the routine can be obtained by writing The RAND Corporation. The use of LIPL is detailed in the Introduction, which is followed by a Reference section arranged for quick lookup of information of the LIPL user. Section III describes the IPL-coded, in-process LIPL loader, J164; the Appendix gives a complete listing of this routine. Section III and the Appendix are included solely for the use of the systems programmer responsible for incorporating LIPL into a particular object machine.

AD-611 857 Div. 30, 14
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF CONTACTLESS CHECK OF NON-METALLIC COATINGS ON A METALLIC BASE,
by A. A. Naumov, V. S. Vikhman, and K. S. Plotnikov. 2 Mar 65, 5p FTD-TT-64-969
TT 65-61794 Unclassified report

Unedited rough draft trans. of Russian patent 158,683, appl. no. 810,861/26-10, 29 Dec 62.

Descriptors: (*Thickness, Measurement), (*Coatings, Thickness), Tritium, Gas discharges, Gas ionization, USSR, Metals.

A method of contactless check of the nonmetallic coatings on a metallic base with the aid of a radioactive source of radiation, which excites characteristic radiation in the base and coating of the part to be checked and ionizes the air gap between the source of radiation and the part, which is distinguished by the fact that for the purpose of simultaneously checking the thickness of the layer of the coating and its discontinuity, the latter is determined by a gas discharge which occurs on the presence of discontinuity in the nonmetallic coating on a metallic base (substrate source of the radiation, for example tritium) and the part to be checked. (Author)

AD-611 862 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEW COMPUTERS,
by V. I. Loskutov. 2 Mar 65, 13p FTD-TT-64-928
TT 65-61799 Unclassified report

Unedited rough draft trans. of Liteinoe Proizvodstvo (USSR) 1964, no. 6, p. 19-22.

Descriptors: (*Computers, USSR), (*Digital computers, USSR), (*Integrators, USSR), (*Reading machines, USSR), Punched cards, Magnetic tape, Input-output devices, Algebra, Differential equations, Partial differential equations.

The intermediate-class Minsk 2 computer is intended for solving scientific and complicated engineering problems. Original data are fed into the Minsk 2 by punched cards and a photoelectric device. The program is started from a central control desk where its subsequent operations are also controlled. A Minsk 22 computer is planned which will be a modification of Minsk 2 and will be for accounting, planning, and statistical computation. The Minsk 22 is equiped with input/output devices that operate with punched cards and a device for alphabetical-digital printing. The small Promin electronic digital computer enables solution of systems of ordinary differential equations of the third order and algebraic ones up to the seventh order and integrations according to the methods of Newton and Chebyshev. The experimental integrator EGDA-9/60 solves 2-dimensional and symmetrical problems described by Laplace's equation with boundary conditions of the first, second, and third orders. The specialized electronic computer EASP-S is intended for researching and projecting objects that operate under the effect of random influences. It includes an electronic optical reading device as input.

AD-611 864 Div. 30
CFSTI Prices: HC$4.00 MF$1.00

System Development Corp., Santa Monica, Calif.

J-S COMPILER MAINTENANCE MANUAL.
Technical memo,
by M. Bleier and H. Bratman. 21 Oct 64, 140p
Rept. no. TM-1682/001/01
Unclassified report

See also AD-296 833, AD-296 834, AD-297 776.

Descriptors: (*Programming languages, Instruction manuals), (*Programming (Computers), Maintenance), (*Compilers, Maintenance), Machine translation, Dictionaries, Tables, Processing, Magnetic tape, Digital computers.

Contents (operations for compiler for Jovial statements):
Processing a typical Jovial statement (generator and translator)
Description of important tables
Communication tables
IL-Intermediate language table
MRM-Machine register memory table
DRQ-Delayed request queque table
Multiple use of tables
The generator (CBB)
The translator (CHB)
Input/output procedures
Tape format
Pseudo-executive (CLOD) program.

AD-611 866 Div. 30, 15
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
TIME-SHARED COMPUTER OPERATIONS WITH BOTH INTERARRIVAL AND SERVICE TIMES EXPONENTIAL.
Professional paper,
by B. Krishnamoorthi and Roger C. Wood.
30 Oct 64, 49p Rept. no. SP-1848/000/00
Unclassified report

Descriptors: (*Computers, Operations research), (*Scheduling, Computers), (*Queueing theory, Computers), Real time, Statistical functions, Systems engineering, Mathematical models, Mathematical analysis, Probability, Computer personnel, Effectiveness.

The concept of time-shared computer operations is briefly described and a model of a time-sharing system is proposed, based on the assumption that both interarrival and service times possess an exponential distribution. Although the process described by this model is non-Markovian, an imbedded Markov chain is analyzed by exploiting the fact that the instants of completion of a 'quantum' of service are regeneration points. It is shown that user congestion possesses a limiting distribution, and the method of generating functions is used to derive this distribution. The concept of cycle time is discussed and two measures of cycle time developed for a scheduling discipline employing a single queue. Finally, a number of numerical examples are presented to illustrate the effect of the system parameters upon user congestion, system response time, and computer efficiency. (Author)

AD-611 867 Div. 30, 26
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
CRITICAL MANAGEMENT POINTS.
Professional paper,
by V. LaBolle. 12 Feb 65, 21p Rept. no. SP-1934
Unclassified report

Presented at the NATO Dept. of Defense Computer Inst., Paris, France, 22 Feb-5 Mar 65.

Descriptors: (*Data processing systems, Systems engineering), (*Management engineering, Data processing systems), Scheduling, Operations research, Analysis, Automatic.

Reviews critical problems in the management of program-system development and recommends tested solutions. Defines management problems as difficulties that prevent or slow a manager in developing a specific product, with limited resources and according to a given schedule. Uses a four-phased model of system development as a framework in which to identify management problems in automatic data processing. Outlines this framework as consisting of: requirements analysis and design, implementation and component test, system integration and test, and operations and feedback. (Author)

AD-611 868 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
SIMULATION OF A TIME-SHARING SYSTEM.
Professional paper,
by Gerald H. Fine and Paul V. McIsaac. 29 Dec 64,
24p Rept. no. SP-1909
Contract SD97
Unclassified report

For presentation at the Institute of Management Sciences Meeting (TIMS), San Francisco, Calif., 3-5 Feb 65.

Descriptors: (*Computers, Operations research), (*Scheduling, Simulation), Queueing theory, Digital computers, Input-output devices, Real time, Optimization, Models (Simulations).

The paper describes the use of simulation techniques in the analysis of time-share system operation. The purpose and goals of this research effort are briefly outlined and some comments on the advantages and disadvantages of direct simulation for this type of work are given. The existing simulator models are described in terms of inputs, general flow, and outputs; and the results of initial investigations with these models are given. Work currently in progress is discussed, and some related problems that may possibly be studied in the future by similar methods are noted. (Author)

AD-611 869 Div. 30
CFSTI Prices: HC$8.35 MF$2.50

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
PROCEEDINGS OF THE 1964 ARMY SCIENCE CONFERENCE UNITED STATES MILITARY ACADEMY, WEST POINT, N. Y. 17-19 JUNE 1964. VOLUME II. (PRINCIPAL AUTHORS 'I' THRU 'Z').
1964, 535p
Unclassified report

See also AD-288 067.

Descriptors: (*Army research, Symposia), (*Symposia, Army research), Bibliographies, Scientific research, Seismology, Automatic weapons, Magnetic materials, Meters, Physical chemistry, Atomospheric electricity, Alloys, Soil mechanics, Photoelectric cells (Semiconductor), Biochemistry, Ballistics, Radiobiology,

Fluorine, Propellants, Concrete, Electric insulation, Cholera, Information retrieval, Lasers, Staphylococcus aureus, Meteorological balloons, Pentolite, Immunology, Titanium, Navigation, Ferrocenes, Ablation, Bacteria, Arboviruses, Organic materials, Photoconductivity.

AD-611 870 Div. 30, 28
CFSTI Prices: HC$3.00 MF$0.75

Tufts Univ., Medford, Mass.
COMPUTER SIMULATION MODELS FOR ORGANIZATION THEORY,
by Thornton B. Roby. 1964, 76p
Technical rept. no. TR-8
Contract Nonr49415, AF19 628 2450
Unclassified report

Descriptors: (*Computers, Simulation), (*Social psychology, Theory), (*Cybernetics, Applied psychology), Group dynamics, Decision making, Management engineering, Sociology, Mathematical models.

A theoretical discussion is presented on the utilization of computers in analyzing organization theory. The computer simulation model is considered a novel and unique theoretical tool. Three aspects of the model are considered: the structure of the initial nucleus from which the model is refined and elaborated; the substantive elements or building blocks of which the model is constructed; and the language in which the model is couched. The process of testing and revising the computer model, and its relationship to empirical data, is discussed. A four-stage testing process is outlined: internal testing, initial tests of ad hoc validity, tests of extended validity or generalizability, and process evaluation.

AD-611 876 Div. 30, 32
CFSTI Prices: HC$4.00 MF$1.00

System Development Corp., Santa Monica, Calif.
DICTIONARIES AND GRAMMAR RULES FOR A COMPUTATIONAL GRAMMAR CODER.
Professional paper,
by Sheldon Klein. 8 Feb 65, 122p Rept. no. SP-1164/001/00
Unclassified report

Prepared in cooperation with Carnegie Inst. of Tech., Pittsburgh, Pa.

Descriptors: (*Dictionaries, Programming (Computers)), (*Programming (Computers), Dictionaries), Programming languages, Vocabulary, Language, Computer operators.

The program assigns grammar codes to words in written English text relying on very small dictionaries (whose combined entries total less than 1500 words) and on a battery of weak but independent syntactic tests. The document should assist a reasonably sophisticated programmer to produce a computational grammar coder program in a programming language of his choice. (Users should note that the order of the entries in the various appendices treats a blank space as a letter somewhere between R and S, according to the Hollerith Code scheme.)

AD-611 899 Div. 30, 4, 25

British Columbia Univ. (Vancouver).
ELLIPSOMETRIC INVESTIGATION OF THE OPTICAL PROPERTIES OF ANODIC OXIDE FILMS ON TANTALUM,
by S. Kumagai and L. Young. 6 Apr 64, 6p
Unclassified report

Pub. in Electrochemical Society. Journal (U. S.) v111 n12 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Tantalum, Films), (*Films, Optical properties), (*Thickness, Films), Measurement, Polarization, Oxides, Tantalum compounds, Tantalum, Test methods, Anodes (Electrolytic cell).

Tantalum surfaces were examined both immersed in the electrolyte and dry. The optical constants of the metal and of the oxide were obtained by comparing experimental and theoretical ellipsometer curves. It was found that the method of estimating the optical constants of the metal by neglecting the effects of the oxide film already present before anodization leads to serious error. The ellipsometric method gave results in agreement with those obtained using light polarized in the plane of incidence. The advantages of the method seem to lie in the investigation of films which are too thin or otherwise unsuitable for the spectrophotometric method, and for in situ measurements. (Author)

AD-611 935 Div. 30

Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
LEARNING CONTROL SYSTEMS,
by K. S. Fu. 1963, 26p
Grant AF AFOSR62 351
AFOSR 65-0326
Unclassified report

Pub. in mono. Computer and Information Sciences, n.p., n.d., p318-43 (Copies not available to DDC Clearinghouse customers).

Descriptors: (*Control systems, Learning), (*Biconics, Learning), (*Artificial intelligence, Control systems), Pattern recognition, Computer storage devices, Cybernetics, Performance (Engineering), Optimization, Simulation, Training, Design.

An informal introduction of learning control systems was presented. A class of learning control systems was described in detail and the basic functions of a learning controller were discussed. Two example basic functions of a learning controller were discussed. Two example systems were given to illustrate the prepared approach. A complete analytic design procedure of learning control systems is under investigation. (Author)

AD-611 943 Div. 30

Suffield Experimental Station, Ralston (Alberta).
SIMPLE TANGENTOMETER,
by W. J. Fenrick. 15 Jul 64, 1p
Unclassified report

Pub. in Review of Scientific Instruments (U. S.) v35 n11 p1616-17 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mechanical drawings, Instrumentation), (*Instrumentation, Drafting), Mirrors.

A half-silvered mirror tangentometer similar to that of Hayman et al (J. Sci. Instr. 34:307 (1957)) is described. It is for attachment to a standard drafting machine, obviating the need for an accurately divided scale since that of the drafting machine is used. Furthermore, no alignment with the principal axes of the graph is required,

since alignment is attained by the initial setting-up of the graph on the table and is automatically maintained by the drafting machine. The device permits the reflection of one half of a curve to be compared with the other half as seen through the half-silvered mirror.

AD-612 020 Div. 30, 2, 15
CFSTI Prices: HC$2.00 MF$0.50

Laboratory for Electroscience Research, New York Univ., N. Y.
PATTERN ANALYSIS OF PLANAR GEOMETRIC CONFIGURATIONS.
Final rept. for 1 Nov 63-31 Dec 64,
by Herbert Freeman. 31 Dec 64, 35p
Grant AF AFOSR24 64
AFOSR 65-0389
Unclassified report

Descriptors: (*Graphics, Data processing systems), (*Computer logic, Decision theory), (*Pattern recognition, Mapping), Maps, Programming (Computers), Digital computers, Mathematical programming, Switching circuits, Mathematical logic, Optimization, Geometric forms, Correlation techniques, Drafting, Algebraic geometry, Abstracts.

The results are described of a research study in pattern analysis. Four investigations were directly concerned with the processing of encoded graphical data in a digital computer, and the fifth was concerned with a special form of majority logic, the so-called m-out-of-n decision logic. The report briefly summarizes these investigations and lists the publications (with abstracts) resulting from the research work.

AD-612 024 Div. 30, 2, 25
CFSTI Prices: HC$3.00 MF$0.75

Parametrics, Inc., Waltham, Mass.
RESEARCH DIRECTED TOWARD INVESTIGATIONS IN SHOCK TUBE LABORATORY ASTROPHYSICS.
Final rept. for 6 Jan 64-5 Jan 65,
by Edmund H. Carnevale, Glenn S. Larson, and Stanley J. Wolnik. 5 Feb 65, 61p
Contract AF19 628 3881, Proj. 8635, Task 863501
AFCRL 65-74
Unclassified report

Descriptors: (*Test equipment, Astrophysics), (*Shock tubes, Spectroscopy), (*Spectroscopy, Shock tubes), (*Gases, Shock waves), Kinetic theory, High-temperature research, Temperature, Density, Ultrasonic radiation, Electron beams, Densimeters, Line spectrum, Thermodynamics.

A brief description is given of the shock tube facility and associated measuring equipment. The theory of radiative transfer in a uniform gas is developed with reference to shock tube spectroscopic measurements. Gas temperatures behind reflected shocks were measured simultaneously by a line reversal technique and by an ultrasonic probe method. The average temperatures agree to within 3-1/2%. Measurements of shock gas density were made with an electron beam gas densitometer. A set of preliminary gf values were determined for ten CrI spectral lines distributed over three multiplets. (Author)

AD-612 034 Div. 30, 16, 28, 32
CFSTI Prices: HC$2.00 MF$0.50

Fordham Univ., New York.
ANALYSIS OF POLYGRAPHIC DATA.
Final rept. for Mar 62-Jul 64,
by Joseph F. Kubis. Jan 65, 45p
Contract AF30 602 2634, Proj. 5534, Task 553401
RADC TDR-64-101
Unclassified report

Descriptors: (*Galvanic skin response, Data), (*Decision making, Galvanic skin response), (*Criminology, Galvanic skin response), Decision theory, Test equipment, Records, Psychophysiology, Stress (Physiology), Stress (Psychology), Emotions, Respiration, Measurement, Reliability, Pulse rate, Analysis, Selection.

To evaluate the feasibility of adapting rapid processing techniques to the present 'art' of polygraph interpretation, it was necessary to evaluate and study the various factors affecting the processes of interpretation of polygraphic data. Two types of decision situations are characteristic of lie detection investigations: the dependent judgment case in which the examiner, after comparing all records, selects the guilty individual (and possibly accomplices) from among a group of suspects known to include the culprit(s); and, the independent judgment case, in which a decision of innocence or guilt is made independently for each suspect on the basis of his record alone. In the latter situation the suspects are usually apprehended one at a time and at irregular intervals. The accuracy of measured and rated physiological response systems used in lie detection was studied. The measured characteristics of three physiological response systems were found to be as accurate as the ratings of the lie detector operators in discriminating between culprit, collaborator, and innocent suspect.

AD-612 037 Div. 30
CFSTI Prices: HC$1.00 MF$0.50

Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
AN ABSTRACT MODEL FOR THE PATTERN RECOGNITION PROCESS,
by Donald L. Richards. Apr 61, 17p
Rept. nos. 3642-1-T, TR-121
Contract AF49 638 884, Proj. 3642
AFOSR 488
Unclassified report

Descriptors: (*Pattern recognition, Model theory), (*Model theory, Pattern recognition), Probability, Decision theory, Learning, Artificial intelligence.

The goal of this work, unlike that of other work in the field of pattern recognition, is the construction of a general recognition model which can apply to any group of patterns and to any amount of initial knowledge about them. In the preliminary model which has been developed, the initial knowledge is presented to the recognizer as a list of conditional probabilities; then, given certain characteristics of the sequence of items which has been seen, the most probable correct answer can be selected. Where these conditional probabilities are not known exactly, they are estimated by a primitive 'learning' process. Decisions are based on a posteriori probabilities and on other criteria studied in decision theory. The model is described in precise detail, and some possible goals of further work are mentioned. (Author)

AD-612 062 Div. 30, 1, 8, 16, 25, 32
CFSTI Prices: HC$7.00 MF$2.00

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.

QUARTERLY PROGRESS REPORT NO. 76. GENERAL PHYSICS, PLASMA DYNAMICS, AND COMMUNICATION SCIENCES AND ENGINEERING,
by H. J. Zimmermann and G. G. Harvey. 15 Jan 65, 389p
Contracts DA36 039AMC03200E, AT30 1 1842
Unclassified report

See also AD-608 280.

Descriptors: (*Reports, Scientific research), (*Scientific research, Reports), (*Electronics, Scientific research), Molecular beams, Microwave spectroscopy, Radio astronomy, Ultrasonic properties, Infrared spectroscopy, Geophysics, Masers, X-ray spectroscopy, Acoustics, Plasma physics, Magnetohydrodynamics, Communication theory, Speech transmission, Machine translation, Cardiovascular system, Decoding, Artificial intelligence, Biophysics, Neurology.

AD-612 140 Div. 30, 25
CFSTI Prices: HC$1.00 MF$0.50

Army Missile Command, Redstone Arsenal, Ala.
GAS VELOCITY PROBE FOR MOVING IONIZED GASES,
by Charles Cason. 1963, 14p
Unclassified report

Also included in Proceedings of the 1964 Army Science Conference, United States Military Academy, West Point, N. Y., 17-19 Jun 64, Volume I, AD-611 432.

Descriptors: (*Probes (Electromagnetic), Ionization gases), (*Ionization gases, Velocity), Measurement, Theory, Magnetic fields, Direct current, Alternating current, Plasma jets, Argon, Errors, Plasma medium.

Comparison between the velocity measured by DC and AC induced fields was satisfying. The plasma jet exhibited rapid fluctuations in gas velocity as seen in both the DC and AC data. Also magnetic fields in the order of 100 gauss were found to slightly distrub the gas flow. For probes in a hot flow where a DC field is used it was found best to alternate the field between 'on' and 'off' to determine extraneous DC effects. When AC measurements are employed a field of the order of 5 gauss is all that is necessary since background 'error voltages' can be easily eliminated at this level. It is expected that flows other than plasma jets would exhibit less fluctuations at the frequency of the tuned voltage amplifier. The lowest saturation ion current obtained was 1.3 ma while the minimum current required by the measurement equipment is of order of microamps. With the use of 1.500K for tungsten probes, it was found that a few microamps did not make a measurable modification of voltage present.

AD-612 165 Div. 30, 32
CFSTI Prices: HC$3.00 MF$0.75

TEMPO, General Electric Co., Santa Barbara, Calif.
DEACON BREADBOARD PROCESSING.
Final rept. for Jan-Sep 64,
by Gregory D. Gibbons and Frederick B. Thompson.
Sep 64, 94p Rept. no. RM-64TMP-12
Contract AF19 628 3385
Unclassified report

Descriptors: (*Language, Information retrieval), (*Information retrieval, Language), (*Digital computers, Control systems), Programming (Computers), Dictionaries, Magnetic tape, Command and control systems, Artificial intelligence.

The DEACON (Direct English Access and Control) Breadboard is an experimental system consisting of a complete package of computer programs, syntactic-semantic rules, and data for establishing the feasibility of basic techniques for direct English access and control of a digital computer. This report is primarily concerned with the processing aspects of the DEACON Breadboard, though the system as a whole is briefly presented. The major routines, including handling of the dictionary, sentence parsing and semantic analysis, are discussed at length. Two methods for using the magnetic-tape peripheral memory in conjunction with list processing are presented. In addition, there is a step-by-step procedure given to show how the tapes are built. (Author)

AD-612 167 Div. 30, 32
CFSTI Prices: HC$2.00 MF$0.50

TEMPO, General Electric Co., Santa Barbara, Calif.
DEACON BREADBOARD SUMMARY,
by Frederick B. Thompson, James A. Craig, Gregory D. Gibbons, John W. Gwynn, and Jacque S. Pruett. Mar 64, 49p Rept. no. RM-64TMP-9
Contract Nonr410100
Unclassified report

See also AD-608 344.

Descriptors: (*Language Information retrieval), (*Information retrieval, Language), (*Digital computers, Control systems), Dictionaries, Programming (Computers), Artificial intelligence, Command and control systems.

The DEACON Breadboard is a complete package of computer programs, syntactic and semantic rules, and data for establishing the feasibility of basic techniques for direct English access and control of a digital computer. The acronym DEACON is derived from Direct English Access and Control; the 'Breadboard' designation indicates the current experimental state of the system. The body of this report is divided into three parts. First, the general environment of DEACON, the general objectives which give meaning to the DEACON Breadboard, the embodiment of DEACON in program and computer, and the next steps beyond the Breadboard are discussed. Second, the most significant technical advance offered in DEACON-the use of semantic transformations of data in direct correspondence with syntactic manipulations-is discussed. Third, the organization of the Breadboard's program structure (how it does the job) is outlined. The appendix contains a listing of the current rules of grammar and a tabulation of the data base.

AD-612 170 Div. 30, 32
CFSTI Prices: HC$2.00 MF$0.50

TEMPO, General Electric Co., Santa Barbara, Calif.
THE SEMANTIC INTERFACE IN MAN-MACHINE COMMUNICATION.
Revised ed.,
by Frederick B. Thompson. Dec 63, 50p
Rept. no. RM-63TMP-35, rev.
Contract Nonr410100
Unclassified report

Revision of rept. dated Sep 63.

Descriptors: (*Language, Information retrieval), (*Information retrieval, Language), (*Computers, Language), Mathematical logic, Programming (Computers).

Contents:
Nature of structure
Semantic counterpart of formal grammars
Analysis of an illustrative sentence
Structure and syntax
Disengagement
Application of the above concepts
Degree of existing knowledge
Semantic classification of man-computer systems

AD-612 171 Div. 30, 32
CFSTI Prices: HC$5.00 MF$1.00

TEMPO, General Electric Co., Santa Barbara, Calif.
DEACON BREADBOARD GRAMMAR.
Final rept. for 1 Jan-30 Sep 64,
by James A. Craig, Jacque S. Pruett, and Frederick B. Thompson. Sep 64, 165p Rept. no. RM-64TMP-14
Contract AF19 628 3385

Unclassified report

Descriptors: (*Language, Information retrieval), (*Information retrieval, Language), (*Digital computers, Control systems), Programming (Computers), Command and control systems, Artificial intelligence.

The DEACON (Direct English Access and Control) Breadboard is an experimental system consisting of a complete package of computer programs, syntactic/semantic rules, and data for establishing the feasibility of basic techniques for direct English access and control of a digital computer. The programs are written in the LAP list processing language for the GE 225 computer. The grammar consists of some 200 phrase-structure type rules written in terms of special parts of speech. The parts of speech reflect the structural features of LAP, the medium used for structuring and storing the data base. The parts of speech reflect general structural properties of the data records referred to by referent words, and thus permit a generalized semantic transformation of data to be written for each syntactic rule. The semantic transformations interrelate the referents (data records) of the words in a phrase to establish a referent, or 'meaning,' for the phrase. The parts of speech used are list, entity, attribute, value, routine, number, variable, truth value, and functional word.

AD-612 331 Div. 30

Stanford Research Inst., Menlo Park, Calif.
THE SOLAR FURNACE... NEW TOOL FOR HIGH-TEMPERATURE WORK. BASIC PRINCIPLES, CHARACTERISTICS OF FURNACES IN OPERATION, LARGE U. S. UNITS PLANNED, HISTORICAL BACKGROUND,
by Guy Benveniste and Nevin K. Hiester. 1956, 6p
Contract AF18 600 1499, Proj. CU1410
AFOSR 3666; AD 81 521

Unclassified report

Pub. in Mechanical Engineering (U. S.) v78 p915-20 Oct 1956 (Copies not available to DDC or Clearinghouse customers).
Presented at the Fall Meeting of the American Society of Mechanical Engineers, Denver, Colo., 10-12 Sep 56, paper no. 56-F-7.

Descriptors: (*Solar furnaces, High-temperature research), Design, Operation.

AD-612 337 Div. 30, 8, 15

Stanford Univ., Calif. Div. of Engineering Mechanics.
THE OPTIMUM RESPONSE OF SECOND-ORDER, VELOCITY-CONTROLLED SYSTEMS WITH CONTACTOR CONTROL,
by Irmgard Flugge-Lotz and Mih Yin. 6 Jun 60, 6p
Contract AF49 638 513
AFOSR 3437

Unclassified repor

Pub. as ASME Paper no. 60-JAC-3.
Rept. presented to the Joint Automatic Control Conference, Cambridge, Mass., 7-9 Sep 60.

Descriptors: (*Control systems, Mathematical analysis), Theory, Iterative methods, Differential equations, Linear systems, Trajectories.

This paper is concerned with the optimum control problem for plants described by second-order differential equations with constant coefficients and with velocity control. Emphasis is placed on the case where the characteristic equation of the system has one zero root and two complex conjugate roots. The problem is studied in terms of the motion of the phase point in a three-dimensional phase space. An iteration method is developed to obtain the optimum trajectory, which in turn gives the optimum response. (Author)

AD-612 414 Div. 30, 1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WIND-TUNNEL BALANCE,
by V. N. Ovchinnikov, V. F. Zaitsev, and V. R. Bertyn'. 8 Mar 65, 6p FTD-TT-64-977
TT 65-61823

Unclassified report

Unedited rough draft trans. of Russian patent 155,641, 24 Jul 62, appl. no. 788,373/26-10.

Descriptors: (*Balances, Wind tunnels), (*Wind tunnels, Balances), (*Instrumentation, Wind tunnels), Aerodynamic configurations, Wind tunnel models, Aerodynamic loading, Measurement, Springs, Patents, USSR.

The invention described is a wind-tunnel balance consisting of a cantilever, a holder for the model, an elastic measuring brace, and string pickups with electromagnetic converters of vibrations, which is distinguished by the fact that for the purpose of improving the static sensitivity and determining the dynamic conponents of the load in the body of the balance on hinged suspension there is an accelerometric element consisting of the load, a spring, and a spring pickup with an electromagnetic converter, the signal equalizes dynamic loads acting on the movable system of the balance.

31. Ships and Marine Equipment

AD-611 540 Div. 31, 8
CFSTI Prices: HC$5.00 MF$1.00

American Machine and Foundry Co., Greenwich, Conn.
NUCLEAR WEAPONS EFFECTS ON SHIPBOARD ELECTRONIC SYSTEMS. VOLUME 2. ANALYSIS OF ANTENNA STRUCTURES FOR BLAST LOADING.
Final rept., vol. 2,
by Roy Levy. 24 May 62, 166p
Contract NObsr85266, Proj. SF0130405, Task 1775
Unclassified report

Descriptors: (*Ship antennas, Blast), Loading (Mechanics), Nuclear explosions, Electronic equipment, Mathematical analysis, Structures, Stresses, Radar antennas, Shipborne, Matrix algebra, Statics, Dynamics, Vibration, Differential equations.

The objectives of the program are to develop methods to evaluate vulnerability of shipboard electronic systems, to illustrate application of the methods, and to formulate design criteria and analytical techniques that will be used to determine construction or modifications of equipment when this equipment must remain operative after exposure to a specified weapon environment. This volume presents an analytical method used to predict blast-induced dynamic stresses of shipboard antenna structures. Volume I contained a discussion of thermal and nuclear radiation effects. In Volume III (currently in preparation), the response of the AN/SPS-5B radar antenna will be investigated and the analytical response will be compared with the response observed from a field test.

AD-611 580 Div. 31
CFSTI Prices: HC$3.00 MF$0.75

Hydronautics, Inc., Laurel, Md.
SUPERCAVITATING PROPELLERS, MOMENTUM THEORY,
by Marshall P. Tulin. Sep 64, 72p
Technical rept. no. TR-121-4
Contract Nonr343500
Unclassified report

Descriptors: (*Propellers (Marine), Theory), (*Cavitation, Propellers (Marine)), Hydrodynamics, Thrust, Velocity, Wake, Mathematical analysis, Fluid flow, Performance (Engineering), Drag, Water tunnels, Marine propulsion, Momentum.

Based entirely on momentum and other simple considerations a reasonably complete picture of the one-dimensional pressure and velocity fields associated with heavily supercavitating propellers and drag discs was constructed. It is shown that the flow is very often retarded while approaching a heavily supercavitating propeller, so that the so-called ideal efficiency of such a propeller takes on values in excess of unity. The ideal efficiency actually increases with decreasing blade cavitational efficiency; however, the net efficiency at the same time decreases. This retardation causes a reduction of thrust deduction, or even a change in its sign. Charts are provided from which the inflow speed may readily be estimated. The effect of water tunnel boundaries are discussed, particularly the phenomena of choking. (Author)

AD-612 055 Div. 31, 14, 26
CFSTI Prices: HC$0.75 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
PLASTIC MOORING BUOYS PART 1. FABRICATION OF EXPERIMENTAL MODELS.
Rept. for May-Sep 64,
by R. W. Drisko and T. Roe, Jr. 5 Mar 65, 24p
Technical rept. no. R-365
Proj. Y F015 99 01 074
Unclassified report

Descriptors: (*Mooring buoys, Plastics), Structural shells, Isocyanate plastics, Expanded plastics, Structural parts, Steel, Glass textiles, Impregnation, Polyester plastics, Design.

Two experimental plastic mooring buoys were designed by BuDocks and fabricated by a private contractor. Each has a cylindrical steel framework to which a tension rod is welded, passing vertically through the axis. A swivel and eye are welded to the top for use on a free-swinging mooring, and an eye is welded to the bottom for joining to a riser chain. The steel framework is filled with closed-cell polyurethane foam. On one buoy this foamed core is covered with an exterior shell composed of ten layers of fiberglass cloth impregnated with polyester resin; on the other, the exterior shell is a sprayed-on coating of chopped fiberglass strands in polyester resin. This report is Part 1. Part 2 will cover the in-service evaluation of these experimental buoys. (Author)

AD-612 185 Div. 31, 16
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
FILTRATION OF SALT SMOKE FROM CHLORATE CANDLE OXYGEN.
Interim rept.,
by S. H. Smith, J. K. Musick, and R. R. Miller.
11 Feb 65, 9p Rept. no. NRL-6216
Proj. SF013 08 03, Tasks 4092, 4093
Unclassified report

Descriptors: (*Oxygen, Life support), (*Aerosols, Filters (Fluid)), (*Chlorates, Decomposition), (*Submarines, Oxygen), Sodium compounds, Chlorides, Glass textiles.

Filtration of a sodium chloride aerosol in high concentration proved to be a continuing problem during the development of chlorate oxygen candles and their associated equipment for use on submarines. Rockwool-wire mesh combinations were first used in welded assemblies which were cleaned by water washing when they became clogged. The rockwool was later replaced with fiberglass blanket, and two modifications of the assembly were made, but the filter use remained inconvenient because of inadequate salt capacity. A progressive step proved to be alteration of the assembly to use a throwaway fiberglass element and elimination of the washing operation. Further improvement was made possible by use of a woven replaceable fiberglass sleeve. The recently constructed assembly incorporating woven sleeve elements is to be subjected to sea trials as soon as possible. (Author)

AD-612 256 Div. 31, 9
CFSTI Prices: HC$6.00 MF$1.50

David Taylor Model Basin, Washington, D. C.
REPORT ABSTRACTS, GENERAL HYDROMECHANICS RESEARCH PROGRAM-CONTRACT PORTION.

Research and development rept.,
by R. D. Cahn, A. B. Harwood, and H. R. Pollard. Feb 65, 289p Rept. no. 1964

Unclassified report

Descriptors: (*Hydrodynamics, Scientific research), Abstracting, Reports, Fluid dynamic properties, Hydrofoils, Naval research, Ships, Design, Submarines, Stability, Ocean waves, Ship noise, Control.

The volume represents a first step in an overall appraisal of the contribution to Naval requirements of the contractors for the Bureau of Ships General Hydromechanics Research Program, which has been functioning since 1952. The volume contains abstracts of all reports and papers distributed through 30 September 1964. In most cases the author's abstract was used. The abstracts are presented by contractor in alphabetical order and by contract number.

32. Miscellaneous Arts and Sciences

AD-611 583 Div. 32, 8, 23

Bureau of Ships, Washington, D. C.
SYMBOLIC INTEGRATED MAINTENANCE MANUAL, A NEW STYLE TECHNICAL MANUAL USING SIMM TECHNIQUES,
2 Jan 65, 38p Rept. no. NAVSHIPS-0900-001-0000
Unclassified report

Rept. prepared jointly with Coast Guard, Washington, D. C.
Available only for reference use at DDC Field Offices.
Copy not available for public sale from Clearinghouse.
Copy available to public from Superintendent of Documents, GPO, Washington, D. C. 20402, as D211.6/2:Sy6.

Descriptors: (*Instruction manuals, Design), (*Electronic equipment, Maintenance), (*Maintenance, Instruction manuals), Documentation, Military publications, Military requirements, Systems engineering, Malfunctions, Maintenance personnel, Military personnel, Weapon systems, Display systems, Circuits, Wiring diagrams, Colors, Reliability (Electronics), Maintainability.

Maintenance of equipment involved in the complex electronics and weapons systems of today's Armed Forces is becoming, in a sense, as important a factor of a tactical situation as the strategy behind the situation. This is because the decision behind, and the method of, so-called 'pushing the button' is becoming more and more dependent upon the proper operation of the communications, radar, sonar, computer, fire control, and other special devices involved in its accomplishment. Inopportune downtime of key equipment is at best expensive, and at worst may conceivably be disastrous. A new maintenance concept is explained which is intended to enable marginally experienced military personnel to keep equipment downtime to the very minimum.

AD-611 613 Div. 32, 30

Institute for Scientific Information, Philadelphia, Pa.
MECHANIZED INDEXING METHODS AND THEIR TESTING,
by John O'Connor. Nov 63, 13p
Contract Nonr418300; Grant AF AFOSR62 257, AFOSR 5154
Unclassified report

Pub. in Association for Computing Machinery. Journal (U. S.) v11 n4 p437-49 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Subject indexing, Computers), (*Documentation, Automatic), Information retrieval, Reading machines, Programming (Computers), Machine translation.

Methods of mechanized indexing (subject indexing by computer) which have been proposed are systematically summarized. Every suggested method consists of some document preparation process (mostly or wholly mechanical) followed by the application of indexing rules to the prepared document. A comprehensive document preparation is described from which proposed methods can be derived by selection. It includes full text input, document place (title, abstract, etc.) marking, sentence and paragraph marking, pronoun replacement, and other syntactic marking. It also includes addition of thesaurus headings, position numbers, weighted frequencies, closely associated expressions, importance measures, and reference information. Three kinds of indexing rules are then distinguished.and illustrated. Several general comments on mechanized indexing include remarks on the argument that good mechanized indexing is not feasible, and the argument that mechanized indexing has the advantage, compared to human indexing, of consistency. Some problems of testing mechanized (or any other) indexing quality by the quality of the retrieval it permits are described. Index duplication studies are suggested as an alternative kind of empirical investigation of mechanized indexing methods. (Author)

AD-611 632 Div. 32, 30
CFSTI Prices: HC$4.75 MF$2.25

Sylvania Electric Products, Inc., Waltham, Mass.
DOCUMENT FORMAT RECOGNITION.
Final rept.,
by Steven B. Gray. Jan 65, 471p Rept. no. F-3060-1
Contract AF30 602 3273, Proj. 4599, Task 459902
RADC TDR-64-463
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Documentation, Reading machines), (*Character recognition, Documentation), (*Pattern recognition, Automatic), Computers, Programming (Computers), Machine translation, Data storage systems, Information retrieval, Periodicals, USSR, Punched cards, Graphics, Simulation.

This study is primarily concerned with methods for analyzing the format of pages from technical journals, and means for automatically processing the textual and graphic material on these pages for input to a computer which is to perform textual data processing functions, such as automatic language translation, automatic abstracting, automatic indexing, etc. This analysis and processing includes text-graphic separation, location of graphics, and textual analysis and recognition. The overall process is considered to be a Format Recognition and Analysis Program operating on a computer-controlled character recognition device. This study has resulted in general design techniques for Format Recognition and Analysis Programs applicable to any document which occurs with text and graphics intermixed. Two such programs have been completed, tested, and demonstrated for two technical journals, one Soviet and one U.S., and a third program has been outlined and partly written for another Soviet journal. It has been found that almost any journal can be programmed without serious difficulty, but new journals require substantially different programs. (Author)

AD-611 636 Div. 32, 18

RAND Corp., Santa Monica, Calif.
DEFENSE AND DEVELOPMENT IN LESS DEVELOPED COUNTRIES,
by Charles Wolf, Jr. 26 Oct 61, 13p
Rept. no. P-2291-1
Unclassified report

Pub. in Operations Research (U. S.) v10 n6 p828-38 Nov-Dec 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Foreign aid, Armed forces (Foreign)), (*Armed forces (Foreign), Effectiveness), (*Armed forces budgets, Management planning), Government (Foreign), Money, Costs, Defense systems, Threat evaluation, Political science, United States Government, Vietnam, North Korea, South Korea, Iran, Economics, Game theory, Decision making, Analysis, Military requirements.

A method is described for examining the question of how military assistance programs in less-developed countries, and their defense forces and budgets, can be modified so as to yield about equivalent military effectiveness, and yet generate improved economic and political side-effects. Research concerned with applying this method to case studies in Viet-Nam and Iran is summarized. The research suggests ways in which program improvements with enhanced side-effects may be made. Qualifications are warranted because of the uncertainties connected with the game-simulation technique for estimating military effectiveness, and the method of judging political side-effects, used in the study. (Author)

AD-611 747 Div. 32, 18
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MILITARY SCIENCES 1964, VOL. 40, NO. 4: SELECTED ARTICLES.
26 Feb 65, 11p FTD-TT-64-1048
TT 65-61787

Unclassified report

Unedited rough draft trans. of Voennye Znaniya (USSR) 1964, v. 40, no. 4, p. 1-2.

Descriptors: (*USSR, History), (*Communism, USSR), (*Antiaircraft ammunition, Rockets), (*Rockets, USSR), Antiaircraft defense systems, Political science.

Under the banner of Lenin's party: Comment on the events in the USSR following the creation of the Communist Party by V. I. Lenin, including the rise in the economy and the importance of the chemical industry. The Sky Should be Clean, by N. Afanasyev: Account of the improvement made in Soviet antiaircraft rocket technology.

AD-611 758 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A NOTE ON FOREIGN ASSISTANCE AND THE CAPITAL REQUIREMENTS FOR DEVELOPMENT,
by Richard N. Cooper. Feb 65, 43p RM-4291-AID
Contract AF49 638 1293

Unclassified report

Descriptors: (*Foreign aid, Distribution (Economics)), Federal budgets, Economics, United States Government, Political science.

This memorandum assumes that the sole purpose for extending foreign assistance is to further economic development in the recipient countries, and that economic development in the recipient countries can be measured solely in terms of increases in real national income properly valued. The memorandum is essentially an exercise in optimization, given the need to conserve resources in the donor and given the objective of raising real national income in the recipient. Foreign assistance extended by the donor can be converted into a grant equivalent, the amount that the donor in effect actually gives away as pure foreign aid. Using a similar technique, a grant equivalent can be defined for the recipient by taking the present discounted value of the foreign assistance and all future debt servicing associated with it. So long as the rate of discount for the recipient exceeds that for the donor, the grant equivalent for a given capital flow will typically be higher for the recipient than it is for the donor. Analysis shows that in the case of straightforward lending maximization is accomplished by lengthening the maturity of the loan indefinitely and raising the interest rate charged on the loan just enough to leave the grant equivalent from the donor unchanged. Optimizing terms for other forms of assistance are more complicated. As illustrations, two recent proposals are examined using the tools of grant equivalents: the investment tax credit proposal and the proposal to subsidize interest rates on flotations by less developed countries in the bond markets of donor nations.

AD-611 874 Div. 32, 15
CFSTI Prices: HC$6.00 MF$1.25

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
DECISIONS UNDER RISK. ECONOMIC APPLICATIONS OF CHANCE-CONSTRAINED PROGRAMMING,
by Bertil Naslund. Nov 64, 202p Rept. no. ONR-RM-134
Contract Nonr76024, Proj. NR047 048

Unclassified report

Descriptors: (*Mathematical programming, Economics), (*Economics, Mathematical programming), Probability, Decision theory, Linear programming, Costs, Budgets, Money, Calculus of variations, Commerce, Mathematical prediction, Operations research.

Contents:
Some formulations of mathematical programming under risk
Chance-constrained programming as a model of decision making under risk
The creation of excess resources under risk
The price of excess resources under risk
Portfolio selection
Capital budgeting under risk
Chance constrained programming as a problem in calculus of variations
Applications of the variational formulation to a production problem.

AD-612 105 Div. 32, 15
CFSTI Prices: HC$1.00 MF$0.50

Brown Univ., Providence, R. I.
OPTIMAL PROGRAMS FOR A MULTI-SECTOR ECONOMY WITH AN INFINITE TIME HORIZON. MATHEMATICAL APPENDIX.
1965, 17p
Contract Nonr56215

Unclassified report

Appendix to rept. of same title, AD-610 492.

Descriptors: (*Economics, Mathematical models), (*Mathematical models, Economics), Optimization, Mathematical programming, Production, Consumption, Theorems.

Proofs are given of eight theorems presented in AD-610 492 of which this report is appended.

AD-612 169 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

Howard Univ., Washington, D. C. Dept. of Economics.
EXTERNAL MILITARY TECHNOLOGICAL TRANSFER AND STRUCTURAL CHANGE.
Preliminary rept.,
by Daniel L. Spencer. Feb 65, 33p
Grant AF AFOSR533 64, Proj. 9779, Task 977902
AFOSR 65-0168

Unclassified report

Descriptors: (*Economics, Japan), (*Industries, Japan), Military facilities, Military procurement,

Culture, Commerce, Labor, Communication systems, Quality control, Industrial production, Troposphere, Scientific research, Specifications, Military requirements.

The rapidity of technological change within a country is functionally related to a nation's propensity to borrow technology. Japan, with a celebrated propensity to borrow Western technology, has, in the post-World War II period, again made impressive gains, based in large part, on borrowed technology. The United States' military presence in Japan has been an important transmission belt making possible much of this technological transfer, and consequent structural change. This research points to basic conclusions that the impact of an external military is far from the negative image popularly conceived. A military presence endowed with a higher technical civilization can initate a fillip to a recipient country's structural evolution. Moreover, military aid, contrary to the often made negative contrast with economic aid, has long-term dynamic effects in the transfer of higher level technology which can shift production functions significantly over time. Implications of the United States military presence also can obtain for other countries as well, but with varying levels of intensity depending on the country's national propensity to borrow technology, and other strategic factors. (Author)

AD-612 187 Div. 32, 26
CFSTI Prices: HC$1.00 MF$0.50

Northwestern Univ., Evanston, Ill. Technological Inst.
DEMON, MARK II: AN EXTREMAL EQUATION APPROACH TO NEW PRODUCT MARKETING,
by A. Charnes, W. W. Cooper, J. K. De Voe, and D. B. Learner. Dec 64. 19p Research memo. RM-110
Contract Nonr122810, Proj. 047 021

Unclassified report

Descriptors: (*Decision making, Economics), (*Economics, Decision making), Management engineering, Production, Distribution, Optimization, Mathematical analysis, Operations research, Equations, Probability.

Numerous alternatives are available in the kinds of studies which can be elected in the market research which should precede the introduction of a new product. This gives rise to a possible network interpretation and treatment by an associated chance-constrained programming characterization and analysis. The resulting model, called DEMON (Decision Mapping Via Optimum GO-NO Networks) is replaced by an approach based on extremal equations. A general analytic characterization is achieved and then replaced by more special ones. Means for effecting study decisions and inferences are discussed along with the sensitivity analyses that we associate with GO and NO preemptions, relative to profit and payback constraints. Payback (in a constraint) is distinguished from its use as a criterion for choice (or objective), the latter being here oriented toward MEMP (maximize expected maximum profit). A chart is provided for interpreting these and other aspects of policy which bear on the problems of marketing a new product and, by reference to this chart, conditions are described in which an increase in the variance of possible outcomes may forestall an otherwise negative decision as when, for instance, expected profits (in a log-normal measure) might otherwise be regarded as 'too low.' (Author)

AD-612 195 Div. 32, 26
CFSTI Prices: HC$3.00 MF$0.75

Georgia Univ., Athens.
THE IMPACT OF TECHNOLOGICAL CHANGE ON THE STRUCTURE AND FUNCTION OF LARGE-SCALE ORGANIZATIONS.
Master's thesis,
by Stanley Philip Greenspon. 1961, 88p
Contract AF49 638 804
AFOSR 2246

Unclassified report

Descriptors: (*Management engineering, Automation), (*Supervisory personnel, Management engineering), (*Professional personnel, Management engineering), Economics, Hospitals, Industries, Military organizations, Government employees.

This study is a part of a project proposing to study the introduction of technological change and its impact on the career professionals and executives who run large-scale organizations technically and administratively. The study undertakes the task of analyzing the independent variable, i.e. the technological change variable. Concern is with two sources of innovations: those generated by research in the physical sciences, and those generated by research in the social sciences. There is reason to believe that each type will tend to have a somewhat different impact on a large-scale organization, or may well affect the components of the organization in a somewhat different sequence. The typology has two distinguishable categories: the mechanical-technical variety as generated by the physical sciences, and the administrative-social variety as generated by the social sciences. To study the impact of such innovations on large-scale organizations, it will also be necessary to have an organizational model of the basic components which comprise an organization. The components to be included are: organizational goals; the formal organization which includes the distribution of functional activities and the formal authority structure; the informal organization; and the reward system. Case studies of various large-scale organizations into which such change was introduced are examined. Represented in these case studies are: industry, the military, hospitals, prisons, and the governmental agencies.

AD-612 196 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
FULL EMPLOYMENT POLICY AND ECONOMIC GROWTH,
by Richard R. Nelson. Feb 65, 19p
Rept. no. P-3072

Unclassified report

Descriptors: (*Economics, Labor), (*Labor, Economics), Mathematical models, Consumption, Money, Industrial production, Stabilization.

This paper explores the relationship between the factors that determine the rate of growth of potential output -- principally labor force growth and technical advance -- and the nature of the fiscal and monetary policies needed to achieve and maintain full employment within the context of a simple aggregative model. The model attempts to integrate two strands of analysis that have developed in the literature -- a neo-classical strand stemming from Solow's work on the growth of full employment output and a neo-Keynesian strand stemming from the Harrod-Domar studies of the conditions under which full employment can be maintained when the dual demand generating and capacity creating role of physical investment are both recognized. (Author)

AD-612 198 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.

RISK-AVERSION IN THE STOCK MARKET: SOME EMPIRICAL EVIDENCE,
by William F. Sharpe. Mar 65, 11p Rept. no. P-3084
Unclassified report

Descriptors: (*Economics, Probability), Money, Industries, Banking, Correlation techniques.

AD-612 200 Div. 32
CFSTI Prices: HC$1.00 MF$0.75

Federal Council for Science and Tech., Washington, D. C.
COSATI SUBJECT CATEGORY LIST.
Dec 64, 60p
PB 166 877
Unclassified report

Descriptors: (*Documentation, Classification), (*Subject indexing, Classification), (*Classification, Handbooks), Reports, Scientific research, Information retrieval, Indexes.

The Subject Category List presented was endorsed by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology as a uniform subject arrangement for (1) the announcement and distribution of scientific and technical reports which are issued or sponsored by Executive Branch Agencies, and (2) for management reporting. The list is a two-level arrangement consisting of 22 major subject fields with a further subdivision of the fields into 178 groups. Scope notes are included for each group. Abstracts, citations and the like, for announcement purpose, can be gathered into these broad subject fields or groups for display to the user. For distribution purposes, these fields or groups may likewise be employed. Similarly, the fields or groups may be useful for arranging projects, tasks, or programs for management reporting purposes. (Author)

AD-612 268 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE TRANSFORMATION OF ALLIANCE SYSTEMS,
by Herbert S. Dinerstein. Feb 65, 43p Rept. no. P-2993
Unclassified report

Descriptors: (*Political science, Foreign policy), (*Foreign policy, Political science), Warfare, History, Government (Foreign), Leadership, Communism, Cold war.

The hypothesis of this paper is that first the increased destructiveness of world war and the very small likelihood of its occurrence and, second, the establishment and expansion of a Communist state system have transformed the nature of international relations.

AD-612 272 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

IBM Federal Systems Div., Rockville, Md.
RESULTS OF CLASSIFYING DOCUMENTS WITH MULTIPLE DISCRIMINANT FUNCTIONS.
Research progress rept.,
by J. H. Williams. 15 Mar 65, 31p
Contract Nonr445600
Unclassified report

Delivered at the Symposium on Statistical Association Methods for Mechanized Documentation, sponsored by the National Bureau of Standards.

Descriptors:(*Reports, Classification), (*Subject indexing, Functional analysis), (*Functional analysis, Subject indexing), (*Classification, Reports), Statistical analysis, Matrix alegra, Transformations (Mathematics), Solid state physics.

An important, but frequently underemphasized step in the classification process is the selection of attributes. In classification problems of mutually exclusive assignment, a set of attributes is selected to represent the category. For information retrieval applications the assumption of mutually exclusive categories may not hold. Therefore, the problem of the selection of measurable attributes to represent the categories becomes more acute. Discriminant analysis appears to offer a solution not only to the selection of attributes problem, but also to the document relevance problem. In the selection phase it provides a method of selecting a set of attributes whose ratio of among-category variance to within-category variance is largest. In the actual classification process a distance measure can then be employed to determine the degree of relevance of a given document with respect to each category. Classification experiments have been conducted on 794 Solid State abstracts. Classification accuracies up to 90 percent were achieved using the discriminant procedures.

AD-612 277 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

Moore School of Electrical Engineering, Univ., of Pennsylvania, Philadelphia.
DESCRIPTION OF CATALOGING AND INDEXING SYSTEM FOR THE ACM REPOSITORY.
Technical rept.,
by Morris Rubinoff and John F. White, Jr. 25 Jan 65, 63p
Contract AF49 638 1421
AFOSR 65-0424
Unclassified report

Descriptors: (*Libraries, Subject indexing), (*Subject indexing, Libraries), (*Catalogs, Libraries), Automation, Documentation, Information retrieval.

The repository library of the Association for Computing Machinery (ACM) was first proposed in 1961, and subsequently the Moore School of Electrical Engineering was designated as the site. The Moore School established an Advisory Board on Information Retrieval, a research team to provide council in relating the repository to current developments. The Moore School research team concentrated on preparation of an organizational and procedural plan for a mechanized information center with 2 principles: (1) a library must make its information as easily accessible to a customer as any store, and (2) information service should be provided at a competitive price. The system aims to store bibliographic elements, 4 echelons of index terms for enhancing user convenience, and a number of document attributes for expediting user search. The system has a 'multiport' entry plan whereby search may be based on any of the many aspects of the contents or the packaging of documents. The concept of the multiport entry is an outgrowth of the Moore School Multilist system (AD-270 573) and has been incorporated into the indexing system via 'Added Info' groups. The scheme also permits stochastic search through the system, i.e. attaining the most applicable word from an initial approximation and a search through related categories, sections and/or classes.

AD-612 289 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AGRICULTURE UNDER KHRUSHCHEV: THE LEAN YEARS,
by Nancy Nimitz. Mar 65, 32p Rept. no. P-3073
Unclassified report

Descriptors: (*Agriculture, USSR), (*USSR, Agriculture), Leadership, Economics, Wages, Labor, Costs, Animals, Cereals, Meat, Corn, Fertilizers, Machines, Production, Statistical data, Political science.

The paper discusses Khrushchev's role in Soviet agriculture from 1953 to 1963. The negligible agricultural output in the second half of the decade is considered in terms of trends in inputs and incentives, the financial problems faced by farms as a result of MTS reorganization, and the central policy issue which emerged after 1958. The author concludes that Khrushchev's voluntaristic approach was inspired by his determination to expand agricultural output at a faster rate than resources would allow.

AD-612 299 Div. 32, 18
CFSTI Prices: HC$4.00 MF$1.00

Research Triangle Inst., Durham, N. C.
CIVIL DEFENSE INFORMATION SYSTEMS ANALYSIS (A FEASIBILITY STUDY OF RESEARCH INFORMATION EXCHANGE).
Final rept., vol. 1, 1 Dec 63-15 Jan 65,
by W. T. Herzog and J. E. Jenkins. Jan 65, 146p
Rept. no. R-OU-158-1
Contract OCD PS64 56, Task 4631B

Unclassified report

Descriptors: (*Civil defense systems, Documentation), (*Information retrieval, Civil defense systems), Subject indexing, Reports, Libraries, Language, Vocabulary, Civil defense personnel, Analysis, Sources, Feasibility studies.

A feasibility study was performed of a civil defense scientific and technical information system that will insure the ready availability of information to all pertinent OCD elements and to contract research personnel. A brief analysis of scientific information systems is presented as background for a discussion of the present civil defense information system. The potential sources of civil defense information are listed. The civil defense information system is defined to be the relationships or exchange between the sources of civil defense information and the users of this information. Methods for improving this exchange are presented. These suggestions include the establishment of an information analysis center, the printing of a quarterly technical progress review, and the use of standard report format and indexing procedures. To foster standard indexing procedures, a 'Thesaurus of Civil Defense Descriptors' is provided (AD-611 438). (Author)

AD-612 302 Div. 32, 26

Washington State Univ., Pullman. Bureau of Economic and Business Research.
PRICING, PRODUCTION, AND MARKETING POLICIES OF SMALL MANUFACTURERS,
by Robert F. Lanzillotti. Aug 64, 89p
Bull. no. B-40

Unclassified report

Available from Bureau of Economic and Business Research, Washington State Univ., Pullman, $3.50 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Industries), (*Economics, Industries), (*Management planning, Commerce), Standards, Industrial production, Costs, Sampling.

This study examines the approach and techniques of business management in small manufacturers. More specifically the inquiry was designed to shed light on the following set of questions: (1) To what extent are the pricing policies and practices used by large businesses applicable to the small manufacturer. (2) Do small manufacturers have specific, identifiable pricing objectives, such as target profit rates relative to investiment or sales, shares of markets, ets. (3) How are pricing decisions made by small manufacturers. (4) What effects do the pricing policies and practices of large enterprises have on the pricing of small firms. (5) For small firms is there any relation between (a) indexes of 'good' management practices (i.e., break-even analysis knowledge of cost and use of price policies) and (b) particular industry features and trade practices.

AD-612 303 Div. 32, 26

Washington Univ., Seattle. Bureau of Business Research.
HOW SMALL BUSINESS FIRMS IN THE STATE OF WASHINGTON COPE WITH THEIR LEGAL PROBLEMS.
Small Business Management Research Repts,
by Sumner Marcus and Edward J. Chambers. Jul 63, 102p

Unclassified report

Available from the Bureau of Business Research, University of Washington, Seattle 5, $2.50.
Copies not available to DDC or Clearinghouse customers.

Descriptors: (*Commerce, Washington (State)), (*Law, Washington (State)), Industries, Money, Economics, Sampling, Statistical tests, Tables, Management engineering.

Contents:
Introduction and scope of study
Method of inquiry
Design of mail questionnaire
Attributes of mail questionnaire respondents
Legal problems of small business firms and their disposition
Selected sample attributes, expenditures on legal services, and the manner of disposition of specific legal problems
Factors influencing the disposition of a legal problem
Conclusions and recommendations

AD-612 304 Div. 32, 26

Washington Univ., Seattle. Bureau of Business Research.
THE BURDEN OF COMPLIANCE. A STUDY OF THE NATURE AND COSTS OF TAX COLLECTION BY THE SMALL BUSINESS FIRM.
Small Business Management Research Repts.,
by Fred J. Mueller. Oct 63, 81p

Unclassified report

Available from the Bureau of Business Research, University of Washington, Seattle, 98105, $2.50.
Copies not available to DDC or Clearinghouse customers.

Descriptors: (*Commerce, Costs), (*Costs, Commerce), Money, Collecting methods, California, Oregon, Washinton, Management engineering.

The study has these objectives: (1) To determine the nature of the taxes required to be collected by the business firm; (2) to isolate the activities of the firm directly related to the collection of, accounting for, reporting, and payment of these taxes; (3) to obtain an appreciation of the costs involved by reference to other studies and by primary investigation; (4) to set forth some conclusions with regard to ways of controlling the costs and reduction of uncertainty and risk. (Author)

AD-612 305 Div. 32, 26

Kentucky Univ., Lexington.
INVESTMENT DECISIONS IN SMALL BUSINESS.
Small Business Management Research Repts.,
by Martin B. Solomon, Jr. 1963, 159p
Unclassified report

Available from University of Kentucky Press, Lexington $3.00
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Decision making), (*Money, Budgets), (*Decision making, Commerce), Errors, Management engineering.

Contents:
Capital budgeting --- an overall view
Capital rationing formulas --- theoretically correct methods
Capital rationing formulas --- alternative methods
Some empirical studies of investment decisions
Uncertainties and errors of estimation
Search activity in investment decisions
The investment decision-making complex --- a case study
Appendixes:
Continuous versus discrete discounting
The infinite chain
Case studies: Dry cleaner case; wearing apparel manufacturers; automatic coin laundry case; wholesale liquor dealer case; food products company; billboard company; vending machine company.

AD-612 306 Div. 32, 26

Kentucky Univ., Lexington.
ACCOUNTING IN SMALL BUSINESS DECISIONS.
Small Business Management Research Repts.,
by James L. Gibson and W. Warren Haynes. 1963, 143p
Unclassified report

Available from the University of Kentucky Press, Lexington $3.00
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Economics, Decision making), (*Decision making, Economics), (*Commerce, Decision making), Printing, Management engineering.

Contents:
Accounting and economics: their relation to decision making
Garden and landscape nurseries
Retail stores
Manufacturing firms
Printing firms
Case studies of incremental analysis
An overview of investment and pricing decisions.

AD-612 307 Div. 32, 23, 26

Iowa State Univ. of Science and Technology, Ames.
STUDIES IN THE FACTOR MARKETS FOR SMALL BUSINESS FIRMS. INTERNAL AND EXTERNAL ASPECTS OF THE CAPITAL, LABOR AND MANAGEMENT MARKETS.
Small Business Management Research Repts.,
ed. by Dudley G. Luckett. Mar 64, 280p
Unclassified report

Available from Publications Office, Morrill Hall, Iowa State Univ., Ames, Iowa, $2.00.

Descriptors: (*Commerce, Management engineering), (*Money, Management engineering), (*Labor, Management engineering).

Contents:
Summary and overview, by Dudley G. Luckett
Bank lending and small business, by Dudley G. Luckett and J. David Lages
Capital budgeting practices in small manufacturing companies, by Robert M. Soldofsky
Career attitudes toward small business, by Dudley G. Luckett
Study of management resources, by Henry H. Albers
Study of fringe benefits in the small firm, by ChesterA. Morgan
Personnel relations in small businesses, by Walter L. Daykin
Labor relations problems of small firms and their solution, by Harold W. Davey.

AD-612 308 Div. 32, 26, 30

Iowa State Univ., Iowa City. Bureau of Business and Economic Research.
OPERATIONS RESEARCH IN SMALL BUSINESS: A CASE STUDY AND PRIMER OF OPERATIONS RESEARCH TECHNIQUES.
Small Business Management Research Repts.,
by Bob R. Holdren, Albert Buckberg, and N. Paul Loomba. Aug 63, 74p
Unclassified report

Available from Iowa State Univ., Iowa City. Bureau of Business and Economic Research. $1.50
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Operations research), (*Operations research, Commerce), (*Inventory control, Commerce), Scheduling, Decision theory, Costs, Statistical analysis, Management engineering.

It can be stated that the basic character of management's problems is not dependent on the size of the firm. The only difference is that large firms have problems which are more complex than those faced by the smaller enterprises. The main conclusion of this report is that in most cases the small business can apply operations research philosophy and methods without incurring prohibitive costs. For most problems, all that is needed to employ these methods is some paper, a pencil, and a desk calculator. Should the volume of work justify it, the same techniques lend themselves to computer programming. Though small business can apply operations research methods without incurring prohibitive costs, the use of these techniques will be limited in those firms which do not have adequate cost and revenue data. It is strongly recommended, therefore, that small business consultants and advisory groups prepare and distribute primers and other organized information on cost accounting and control, as well as on operations research techniques of the kind described in the report.

AD-612 355 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

California Univ., Los Angeles.
ON THE EVALUATION OF GROWTH EQUITY SHARES.
Working paper,
by Arnold Reisman. Feb 65, 17p
Working paper no. WP-63
Contract Nonr23373, Proj. 047 003
Unclassified report

Prepared in cooperation with Western Management Science Inst., Los Angeles, Calif.

Descriptors: (*Costs, Mathematical models), (*Commerce, Costs), (*Economics, Theory), Equations.

A mathematical model for equity share valuation or price is developed. The model incorporates the three hypotheses that individually have constituted the bases of previous works in the area. (1) In the pure earnings hypothesis, the price of a share of stock is considered to be the discounted worth of its earnings in perpetuity. (2) In the pure dividend hypothesis, the price is considered to be the discounted worth of future dividends to perpetuity. (3) In the finite horizon hypothesis, the price is assumed to be equal to the discounted worths of dividends, to be paid within a given and finite horizon of a certain number of periods, and the estimated value of the share at the end of that time. The model also permits growth to be financed by any combination of the common methods. By assigning specific values to some of the parameters, the model reduces to most well known models of the literature.

AD-612 356 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

California Univ., Los Angeles, Calif.
THE ECONOMICS OF UNCERTAINTY, I.
Working paper,
by Karl Borch. Jan 65, 17p Working paper no. WP-65
Contract Nonr23375, Proj. 047 041
Unclassified report

This paper is based on notes prepared for a series of lectures given at the Graduate School of Business Administration, California Univ., Los Angeles, during the academic year 1964-65
Prepared in cooperation with Western Management Science Inst., Los Angeles, Calif.

Descriptors: (*Commerce, Game theory), (*Game theory, Commerce), Operations research, Economics, Decision making, Dynamic programming, Costs.

The paper is an introduction to a broad survey of the uncertainty element in economics. The paper leads up to a game-theoretical formulation of the problem, stressing the interdependence of the actions taken by all decision makers in the system. (Author)

AD-612 364 Div. 32, 18

Agency for International Development, Washington, D. C.
PROPOSED MUTUAL DEFENSE AND DEVELOPMENT PROGRAMS FY 1966.
Summary Presentation to the Congress.
Mar 65, 247p
Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C. 20402, $2.00.
For DDC users only.

Descriptors: (*Defense systems, Foreign policy), (*Foreign aid, United States Government), (*Asia, Foreign aid), (*Central America, Foreign aid), (*Sough America, Foreign aid), (*Africa, Foreign aid), Economics, Federal budgets, Management engineering, United States.

Contents:
Foreign aid in perspective
The alliance for progress
The Near East South Asia
The Far East
Africa
Private resources for development
Management improvements
Other assistance programs
Analysis of the fiscal year 1966 request by funding category.

AD-612 365 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
FOREIGN POLICYMAKING: PLURALISTIC POLITICS OR UNITARY ANALYSIS,
by Paul Y. Hammond. Feb 65, 35p
Rept. no. P-2961-1
Unclassified report

Descriptors: (*Foreign policy, Theory), (*Political science, Foreign policy), United States Government, History, National defense.

The substance of foreign policy is viewed as pragmatic, unitary, or pluralistic. The pragmatic view attempts to solve specific problems through a mastery of specific data, the unitary argues for comprehensive solutions on the basis of some general vision of the truth, and the pluralistic asserts the value of many approaches and denies the certainty of any one of them. This article is an attempt to deal explicitly with the relationship of the unitary and pluralistic approaches to each other in a discussion primarily of U. S. foreign policy. In particular cases, the issue between the unitary and pluralistic approaches may be drawn over whether (1) there should be reliance on development of a satisfactory set of tools for analyzing and making policy and on their skillful application, or (2) the analysis of policy making should be confined predominantly to describing the political process of policy making.

AD-612 380 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
TECHNICAL WRITERS: EDUCATED OR TRAINED,
by Virgil Peterson. Mar 65, 9p Rept. no. P-3069
Unclassified report

Descriptors: (*Reports, Professional personnel), (*Documentation, Professional personnel), (*Professional personnel, Education), Training, Computers, Programming (Computers), Vocabulary, Language, Social communications.

The paper discusses the influence computers will have on the future of editors and technical writers, by describing two possible innovations. One is a typewriter-like console which gives the editor access to computer services. Editing can be accomplished on the console and changes entered into the computer's memory for subsequent print out. The second is a tablet on which the editor can, by the use of a stylus, make changes in a text which moves before him on a screen. The author argues that these innovations, while they change certain habits of the editor, do not change the responsibilities of the editor nor do they change his position in the communication process. Computers, if they make any change at all, will simply make the editor's work more exacting. Therefore he needs the same kind of education he has always had--an education in the basic communications disciplines--but his need for that education is even more urgent than it was in the past. Tomorrow's technical writer, like today's, should have sensitivity to words, awareness of mathematics, and experience in a science. (Author)

AD-612 382 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ECONOMIC GROWTH AND POVERTY,
by Richard R. Nelson. Mar 65, 14p Rept. no. P-3082
Unclassified report

Descriptors: (*Economiccs, United States), Distribution (Economics), Money, Labor, Wages, Population, Education, Consumption, Industries, Social sciences.

The paradoxical existence of poverty amidst rapid economic growth in the United States is discussed. The problem is considered in terms of average income levels; adjustments required in view of technological progress, production rates, and supply and demand; and prospects for the future educational needs of skilled and unskilled laborers.

AD-612 386 Div. 32, 26

Minnesota Univ., Minneapolis. School of Business Administration.
THE FRANCHISE SYSTEM OF DISTRIBUTION.
Small Business Management Research Repts.,
by Edwin H. Lewis and Tobert S. Hancock.
Nov 63, 102p
Unclassified report

Available from Research Div., School of Business Administration, Univ. of Minnesota, Minneapolis 55455, $2.50 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Distribution (Economics), Commerce), (*Commerce, Distribution (Economics)), Economics, Management engineering.

The working relationships between franchise companies and their franchised dealers are analyzed. The benefits derived from the use of a franchise system of distribution for both the franchisor and franchisee are determined. The principal problems encountered by the parties to the franchise agreement are isolated, and this method of distribution is evaluated from the standpoint of both the franchise company and franchised dealers and to assess its impact on the marketing economy of the nation.

AD-612 387 Div. 32, 23, 26

Minnesota Univ., Minneapolis. School of Business Administration.
EXECUTIVE DEVELOPMENT: A COMPARISON OF SMALL AND LARGE ENTERPRISE.
Small Business Management Research Repts.,
by Douglas C. Basil. Nov 64, 80p
Unclassified report

Available from Div. of Research, School of Business Administration, Univ. of Minnesota, Minneapolis 55455, $1.50 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Supervisory personnel, Training), (*Management engineering, Training), (*Training, Management engineering), Commerce, Education, Economics.

The problem of obtaining capable management particularly plagues the small firm. This study was undertaken to discover what is being done to develop business executives in small firms and to see whether particular patterns of executive development may be recommended for the smaller firm. Areas covered include: Impediments to establishing executive development programs in small firms; investigation of executive development in the small firm; background, training, and work experience of top management; executive development techniques; executive development programs and practices in filling vacancies; and some recommendations on management development for the smaller firm.

AD-612 388 Div. 32, 26, 33

Minnesota Univ., Minneapolis. School of Business Administration.
OPPORTUNITIES AND PROBLEMS FOR SMALL BUSINESS IN FOREIGN TRADE VIA THE ST. LAWRENCE SEAWAY.
Small Business Management Research Repts.,
by Edmund A. Nightingale and Donald V. Harper.
Nov 64, 225p
Unclassified report

Available from Research Div., School of Business Administration, Univ. of Minnesota, Minneapolis, $3.00 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Inland waterways), (*Inland waterways, Commerce), Water traffic, Transportation, Cargo, Distribution (Economics), Economics, Management planning.

This study attempts to break new ground, with the cooperation of firms responding to the export and import questionnaires, in seeking area and state data concerning participation in foreign trade by size of firm, kinds of business engaged in, kinds and tonnages of commodities exported to the several foreign-trade areas of the world, and similar data with respect to imports into the area and the states therein. These data relate to the base year 1960, the second year of the Seaway operation. The study attempts further to ascertain for the area kinds and tonnages of various commodities which moved in international trade over the Seaway in the base year 1960.

AD-612 389 Div. 32, 26

California Univ., Berkeley. Inst. of Business and Economic Research.
MANUFACTURING COST REDUCTION THROUGH THE CURVE OF NATURAL PRODUCTIVITY INCREASE.
Small Business Management Research Repts.,
by E. C. Keachie. Sep 64, 89p
Unclassified report

Available from Inst. of Business and Economic Research, Univ. of Calif., Berkeley, 94720, $2.50.

Descriptors: (*Commerce, Costs), (*Costs, Reduction), (*Management planning, Costs), Economics, Production control, Industrial production, Management engineering.

An empirical attempt is made to find facts and ideas about cost reduction that could help the small manufacturer to compete more effectively.

AD-612 390 Div. 32, 26

California Univ., Berkeley. Inst. of Business and Economic Research.
PROFITABILITY AND SIZE OF FIRM.
Small Business Management Research Repts.,
by H. O. Stekler. Aug 63, 122p
Unclassified report

Available from Inst. of Business and Economic Research, Univ. of California, Berkeley. $2.50
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Money), (*Money, Commerce), Economics, Industries, Industrial production, Costs, Distribution (Economics), Statistical analysis, Management engineering.

Contents: The profit ratio as a measure of the relative ability of firms to expand; the profit dratio as a measure of efficiency; other uses of the profit ratio; earlier studies using the profit ratio; valid conclusions of earlier studies: assets vs. net worth; methodology of this study; distribution of post-tax profit ratex; effect of taxes on the relative ability to expand; relative profitability of income firms; variability of profit rates; intra-class variability of profit rates, 1955; the time variability of firms' profit rates; quantitative analysis of post-tax distributions; interpretation of Crum's and Alexander's results for profitable firms.

AD-612 391 Div. 32, 26

Duke Univ., Durham, N. C.
CHOOSING A FORM OF BUSINESS ORGANIZATION.
Small Business Management Research Repts.,
by Robert N. Davies and Kelvyn H. Lawrence. Apr 63, 161p
Unclassified report

Available from Small Business Studies, Duke Law School, Durham, North Carolina, $4.00.
Copies not available to DDC or Clearinghouse customers.

Descriptors: (*Commerce, Determination), (*Management planning, Commerce), Management engineering.

Contents:
Non-tax considerations in the choice of business form
Tax considerations in the choice of a form of business association
Tax control and choice of business form
Subchapter S corporations (Int. Rev. Code of 1954, paragraphs 1371-77), permitting shareholders of small business corporations to be taxed directly on the corporation's earnings rather than have the corporation taxed as an entity at normal corporate rates
Choice of business form and the professional man
Appendix: Articles of Association of Southwest Clinic Association, Dallas, Texas

AD-612 392 Div. 32, 23, 26

Duke Univ., Durham, N. C.
DEFERRED COMPENSATION FOR KEY EMPLOYEES. A PLANNING GUIDE FOR SMALL BUSINESSMEN AND LAWYERS.
Small Business Management Research Repts.,
by Clark C. Havighurst. 1964, 393p
Unclassified report

Available from Small Business Studies, Duke Univ., School of Law, Durham, North Carolina.
Copies not available to DDC or Clearinghouse customers.

Descriptors: (*Supervisory personnel, Wages), (*Commerce, Management planning), (*Personnel management, Instruction manuals), Management engineering.

Contents:
The role of deferred compensation in small enterprises
The problems of the small business in compensating key employees
Qualified pension and profit-sharing plans
An introduction to qualified plans
The advantages of qualification
Tailoring a plan for key employees
First steps in planning a qualified program
Handling pension and profit-sharing costs
Tax-favored deferred compensation programs for the self-employed
The tax treatment and utility of Keogh plans
Non-qualified and stock-related deferred compensation programs
The characteristics and tax treatment of non-qualified arrangements
Stock-related deferred compensation programs.

AD-612 393 Div. 32, 23, 26

Texas Univ., Austin. Bureau of Business Research.
SIMULATION TRAINING FOR SMALL BUSINESS EXECUTIVE DEVELOPMENT.
Small Business Management Research Repts.,
by Alfred G. Dale, Francis B. May, Charles T. Clark, and P. John Lymberopoulos. Apr 63, 112p
Unclassified report

Available from the Bureau of Business Research, Univ. of Texas, Austin, $1.50 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Management engineering, Simulation), (*Training devices, Management engineering), (*Decision making, Management engineering), Commerce, Data processing systems, Programming (Computers), Graphics, Urban areas, Texas.

Contents:
Competitive and operational problems of small firms
Experimental testing of the simulation model
Simulation exercises in seven Texas cities: Beaumont, Dallas, El Paso, Fort Worth, Houston, Lubbock, San Antonio.

AD-612 394 Div. 32, 23, 26

Texas Univ., Austin. Bureau of Business Research.
THE SMALL BUSINESS EXECUTIVE DECISION SIMULATION: ADMINISTRATOR'S MANUAL.
Small Business Management Research Repts.,
by Alfred G. Dale, Francis B. May, Charles T. Clark, and P. John Lymberopoulos. Apr 63, 153p
Unclassified report

Includes AD-612 395.
Available from Texas Univ., Austin. Bureau of Business Research $1.50.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Management engineering, Simulation), (*Training devices, Management engineering), (*Decision making, Management engineering), Instruction manuals, Programming (Computers), Decision theory, Training, Mathematical models, Economics, Commerce.

The report, describes the structure and operation of the small business simulation, is a reference manual for administrators. The materials contained in Appendix I are facsimiles of the materials used during a simulation exercise by the administrator and/or the participants.

AD-612 395 Div. 32, 23, 26

Texas Univ., Austin. Bureau of Business Research.
THE SMALL BUSINESS EXECUTIVE DECISION SIMULATION: OPERATING MANUAL.

Small Business Management Research Repts.,
by Alfred G. Dale, Francis B. May, Charles T. Clark, and P. John Lymberopoulos. Apr 63, 38p

Unclassified report

Available from Texas Univ., Austin. Bureau of Business Research $3.00
(Copies not available to DDC or Clearinghouse customers).
Included in AD-612 394.

Descriptors: (*Management engineering, Simulation), (*Instruction manuals, Decision making), Training devices, Learning, Economics, Commerce.

AD-612 396 Div. 32

Brown Univ., Providence, R. I.
REBUILDING CITIES. THE EFFECTS OF DISPLACEMENT AND RELOCATION ON SMALL BUSINESS.
Small Business Management Research Repts.,
by Basil G. Zimmer. 1964, 374p

Unclassified report

Available from Quadrangle Books, Inc., 180 North Wacker Drive, Chicago, Ill. 60606, $7.50.
(Copies not available to DDC or Clearinghouse customers)

Descriptors: (*Commerce, Urban planning), (*Urban planning, Commerce), Urban areas, Buildings, Housing, Population, Transportation, Management engineering, Economics.

Contents:
Purpose and significance of the study
Non-survivors
Problems of relocation
Suburbanization
Type of business
Size of business
Adjustment following relocation

AD-612 397 Div. 32, 26

Brown Univ., Providence, R. I.
ESTATE TAX VALUATION IN THE SALE OR MERGER OF SMALL FIRMS.
Small Business Management Research Repts.,
by Chelcie C. Bosland. Jan 63, 296p

Unclassified report

Available from Simmons Boardman Publishing Corp., 30 Church Street, New York 7, N. Y. $10.00.
(Copies not available to DDC or Clearinghouse customers)

Descriptors: (*Commerce, Industries), (*Industries, Commerce), Management engineering.

This study sought to determine if tax valuation problems have been a leading cause of decisions to merge in the past five years. It then undertook to discover whether these problems arose from faulty valuation practices by the Internal Revenue Service and uncertain or inadequate relief in the courts. An analysis of some 150 decisions of the Tax Court, and other courts, revealed the valuation methods employed by the Service and their validity under court review. While the purpose was to discover the basic facts about tax valuation as a merger motive, some recommendations for improvement are made, with the expectation that their adoption might remove some artificial and needless incentives to sell out. (Author)

AD-612 398 Div. 32, 26

Brown Univ., Providence, R. I.
THE FLOW OF FUNDS IN SMALL BUSINESSES AND IN LARGE BUSINESSES. PART I.
Small Business Management Research Repts.,
by Caleb A. Smith. Jul 63, 172p

Unclassified report

Available from Brown University Bookstore, Providence 12, R. I. $2.50
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Money), (*Money, Commerce), Cements, Management engineering.

The principal purpose of this study was to make available a body of flow of funds data for a sufficiently large sample of companies to reveal the range of variations in the flow of funds in different businesses. The data have at least two possible types of use. The first is of direct concern to businessmen, especially small businessmen and their counselors. This is the use of the data as a basis for comparison in evaluating the flow of funds in a given business. The study of the cement company is an example of a use of this sort. A second type of use is by research workers who may wish to study such matters as (a) the range of variations in fund flows of different companies facing somewhat similar conditions, or (b) the underlying causes which may lead to differences in the fund flow behavior of different companies, or (c) the effect of general economic conditions on the flow of funds in businesses.

AD-612 399 Div. 32, 26

Wichita Univ., Kans. Center for Business Management Services.
BUYING AND SELLING A SMALL BUSINESS.
Small Business Management Research Repts.,
by Verne A. Bunn and Curtis D. Terflinger.
Mar 63, 158p

Unclassified report

Available from The Center for Business Management Services, College of Business Administration, Univ. of Wichita, Kans., $2.00 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Bargaining), Costs, Decision making, Inventory, Management engineering.

Part One takes the form of a manual of the processes and techniques of buying and selling a small business. This material is presented in a chronological order in what typically constitutes the step-by-step procedure involved in the buy-sell transaction, from locating a buyer or seller to finalizing the transaction and planning for operation under new ownership and management. Part Two reports the nature of the research conducted during the course of the investigation and is intended to serve as background data and to enlarge upon much of the material presented in Part One.

AD-612 400 Div. 32, 26

Nebraska Univ., Lincoln. Coll. of Business Administration.
RESEARCH ACTIVITY, PRODUCT DIVERSIFICATION, AND PRODUCT DIFFERENTIATION BY SMALL MANUFACTURERS IN NEBRASKA.
Small Business Management Research Repts.,
by Campbell R. McConnell and Wallace C. Peterson.
Apr 63, 96p

Unclassified report

Also available from Nebraska Univ., Lincoln. Coll., of Business Administration $1.00
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nebraska, Industries), (*Industries, Nebraska), (*Industrial production, Nebraska), (*Industrial research, Nebraska), Commerce, Economics, Management engineering.

This is an empirical study of the behavior of small manufacturing concerns with respect to technological research, product differentation, and product diversification. It seeks answers to questions such as these: What amount of research--formal and informal--is carried on by small manufacturing firms. What are the purposes of this research. How many products do small manufacturers produce. Why do some firms produce a large number of products while others concentrate on just one or a very small number. To what extent do small firms attempt to differentiate their products from those of rival firms. What techniques are used in seeking to differentiate. All of these are questions about which economists know relatively little. (Author)

AD-612 401 Div. 32, 26

Indiana Univ., Bloomington. Bureau of Business Research.
LONG-RANGE PLANNING FOR SMALL BUSINESSES.
Small Business Management Research Repts.,
by Raymond M. Haas, Richard I. Hartman, John H. James, and Robert R. Milroy. Jul 64, 136p
Unclassified report

Available from the Bureau of Business Research, Indiana University. Price unknown.
Copies not available to DDC or Clearinghouse customers.

Descriptors: (*Management planning, Commerce), (*Commerce, Management planning), Personnel management, Production control, Budgets, Operations research, Economics, Decision making, Management engineering.

Contents:
Formulation of objectives
Forecasting and planning
Organization development
Planning managerial manpower
Product planning
Return on investment
Financial planning
Reevaluation and revision
Case studies
Bibliography.

AD-612 402 Div. 32, 26

Alabama Univ., University. Bureau of Business Research.
PLANNING FOR CONTINUITY OF SMALL BUSINESS FIRMS IN ALABAMA.
Small Business Management Research Repts.,
by Maurice C. Mackey, Jr. Jun 63, 81p
Unclassified report

Available from Bureau of Business Research, Univ. of Alabama, University, $1.00 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Alabama), (*Law, Alabama), Money, Management planning, Management control systems, Management engineering.

Contents:
Planning the formation of a small business
Forms of business organization
Capital structure for the small business
Control and management of a small business
Transfer of a substantial interest in a small business.

AD-612 403 Div. 32, 26

Richmond Univ., Va. Bureau of Business Research.
THE USE OF CONSULTANTS BY MANUFACTURERS.
Small Business Management Research Repts.,
by David C. Ekey and W. David Robbins. Feb 64, 189p
Unclassified report

Available from School of Business Administration, Univ. of Richmond, Va., $10.00 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Management planning), (*Management planning, Effectiveness), (*Industrial plants, Management planning), Procurement, Statistical analysis, Virginia, Management engineering.

The purpose of the study was to identify and evaluate characteristics of the consulting experiences of small manufacturing firms located in Virginia. The findings are based on replies from the 961 manufacturing firms that cooperated in the study. The investigation utilized both statistical data from questionnaire returns and information obtained from interviews in seventy-three case studies. One secondary phase of the study presents pertinent case study findings on the experiences of forty Virginia manufacturing firms in government procurement. (Author)

AD-612 404 Div. 32, 26

Virginia Univ., Charlotteville. Bureau of Population and Economic Research.
MANAGEMENT OF SMALL ENTERPRISES. CASES AND READINGS.
Small Business Management Research Repts.,
by William Rotch. 1964, 331p
Unclassified report

Available from the Bureau of Population and Economic Research, University of Virginia, Charlottesville, Virginia, $3.00.
Copies not available to DDC or Clearinghouse customers.

Descriptors: (*Commerce, Management engineering), Costs, Economics, Management planning, Money, Industrial production, Personnel management, Public relations.

Contents:
Starting a new business
Developing a business
Major expansion of a business
Special Situations
Readings.

AD-612 405 Div. 32, 23, 26

New Mexico Univ., Albuquerque. Bureau of Business Research.
EXECUTIVE SELECTION, DEVELOPMENT, AND RETENTION PRACTICES OF RAPIDLY GROWING SMALL BUSINESS.
Small Business Management Research Repts.,
by Howard V. Finston and Karl Christman. May 64, 52p
Unclassified report

Available from Bureau of Business Research, the University of New Mexico, Albuquerque, $2.00. Copies not available to DDC or Clearinghouse customers.

Descriptors: (*Commerce, Personnel management), (*Personnel management, Decision making), (*Supervisory personnel, Selection), Manpower studies, Training, Job analysis, Social communication, Performance (Human), New Mexico, Management planning, Universities, Management engineering.

Contents
Problem and Procedure
Initial contacts
Organizational structure of the small firm
Practices of recruitment and selection
Development, evaluation, and retention of managerial personnel
Communication environment
The small-business view of the future: Planning for growth
Small business and the business school--partners or strangers.

AD-612 406 Div. 32, 23, 26

Montana State Univ., Missoula. Bureau of Business and Economic Research.
A PILOT STUDY OF SUCCESSFUL AND UNSUCCESSFUL SMALL BUSINESS ENTERPRISES WITHIN MONTANA,
Small Business Management Research Repts.,
by Edward J. Chambers and Raymond L. Gold. Jun 63, 82p

Unclassified report

Available from Montana State Univ., Missoula. Bureau of Business and Economic Research, $1.00. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Commerce, Montana), (*Montana, Commerce), Economics, Employee relations, Management engineering.

The overall objective of the study was to determine what factors, both procedural and attitudinal, may be especially relevant to business success and failure in the Northern Rocky Mountain region. To accomplish this objective it was necessary to set up a working hypothesis for use in analyzing the interrelations among the factors discovered. The hypothesis formulated was that there are systematic differences in the attitudes of successful and unsuccessful businessmen, as well as in the procedures which they employ, and that the degree of success achieved by a small enterprise can best be explained by reference to both attitude and practice.

AD-612 427 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SOME COMPARISONS BETWEEN THE RUSSIAN AND CHINESE 'MODELS',
by Donald S. Zagoria. Mar 62, 41p
Rept. no. P-2561

Unclassified report

Descriptors: (*Communism, History), (*China, Communism), (*USSR, Communism), (*Asia, Communism), Communists, Economics, Political science, Government (Foreign), Sociology.

The Russians and Chinese have disagreed on whether or not the Chinese road to communism is more relevant than the Russian for underdeveloped areas. This disagreement seems to be intimately bound up with a struggle for power and spheres of influence in Asia and other underdeveloped areas. The Soviet model has proved to have important weaknesses when applied to China, an underdeveloped Asian country. It is by no means obvious that the Chinese communists have as yet discovered a more suitable model for themselves. Of the factors which help account for differences in Russian and Chinese roads to socialism, the most important would seem to be the great difference in population-resource ratios; the fact that the Chinese could benefit from Soviet mistakes and from Soviet help; the fact that they had the benefit of twenty or more years of regional power; the considerable differences in the manner in which the two parties acquired and in China before the seizure of power; and, the fact that the two countries are at differing stages of socio-economic development. (Prepared for presentation at a meeting of the Assn for Asian Studies, Boston, April 2-5, 1962).

AD-612 429 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ECONOMIC GROWTH AND SOVIET-AMERICAN RIVALRY,
by Abraham S. Becker. 21 Apr 61, 19p
Rept. no. P-2286

Unclassified report

Descriptors: (*Economics, Cold war), (*Cold war, Economics), Commerce, Foreign policy, Industrial production, Analysis, USSR, United States, Political science.

A discussion is presented on various aspects of the function in the cold war of the U.S. - U.S.S.R. rivalry in economic power and growth.

33. Transportation

AD-612 290 Div. 33, 1
CFSTI Prices: HC$3.00 MF$0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
ANALYSIS OF APPROACH LIGHTING CONFIGURATIONS FOR VISUAL TRANSITION UNDER CATEGORY II OPERATING CONDITIONS.
Interim rept.,
by Robert K. McKelvey and Guy S. Brown. Sep 64, 90p Rept. no. RD-64-134
Proj. 430 202 02R

Unclassified report

Descriptors: (*Approach light, Landing aids), (*Landing lights, Runways), Lighting equipment, Airports, All-weather aviation, Pilots, Training, Visual acuity, Flight simulators, Performance tests, Analysis of variance.

Three experiments were conducted to determine requirements for modification of the present U. S. National Standard Approach Lighting System (Configuration A) to meet Category II visibility operating requirements (1,200-foot Runway Visual Range). A building blocks approach was used in which each increment in configuration complexity had to be justified on the basis of a demonstrated gain in performance while the pilot is being systematically exercised in the utilization of the system. The experiments were conducted in a visual landing simulator. The results indicate that satisfactory performance of visual transition for landing can be achieved with a basic center row and crossbar configuration, including sequence flashing lights operated to the point of acquisition of the steady burning light components of the system. (Author)

AD-612 291 Div. 33
CFSTI Prices: HC$1.00 MF$0.50

Systems Research and Development Service, Federal Aviation Agency, Washington, D. C.
SCHEDULED AIR CARRIER FLIGHT ACTIVITY IN THE UNITED STATES, NOVEMBER 1964.
Interim rept.,
by Ellen S. Reynolds. Feb 65, 17p
Rept. no. RD-65-16
Proj. 141 411 01A

Unclassified report

Descriptors: (*Air traffic, Scheduling), (*Flight paths, United States), Aviation industry, Aircraft, Air transportation, Commercial planes, Programming (Computers).

This report describes flight activity scheduled by commercial air carriers in the United States during Nov. 1964. It was prepared from an IBM tape containing records of all flights listed in the November 1-15, 1964 issue of the North American Edition of the Official Airline Guide. Flight activity is described in terms of airline, aircraft type, day of week, hour of day and patterns of flow. (Author)

AD-612 292 Div. 33, 1, 19
CFSTI Prices: HC$2.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
A STUDY OF THE SENSITIVITY OF A SUPERSONIC AIRCRAFT TO THE EFFECT OF VARIOUS HORIZONTAL TEMPERATURE DISTRIBUTIONS.
Final rept.,
by Sidney M. Serebreny. Oct 64, 41p
Contract FAA BRD420, Proj. 350 103 01R, 3767
FAA RD-64-111

Unclassified report

Descriptors: (*Fuel consumption, Atmospheric temperature), (*Flight paths, Supersonic planes), (*Air traffic, Flight paths), Air transportation, Distribution, Sensitivity, Air traffic control systems, Transport planes, Optimization, Wind, Atlantic Ocean, New York, France, Great Britain.

The effect of the variations in the horizontal distribution of temperature on supersonic transport operation in cruise was studied on the New York/London-Paris route. From the data sample the range of temperature variations was established. Temperature variations in 24 cases were run through a NASA computer program and fuel consumption derived. The results of this program closely approximated the theoretical temperature fuel consumption. In none of the cases did the temperature gradient warrant diversion from great circle. The cases chosen reflected extremes of departure from standard and present a seasonal distribution of such variations. Average route temperature differences from 141 selected dates substantiate the predominant lack of adequate gradients for such track diversions from great circle. (Author)

AD-612 363 Div. 33, 1, 8
CFSTI Prices: HC$6.00 MF$1.25

Collins Radio Co., Cedar Rapids, Iowa.
COMPUTER/SIMULATION STUDY OF AIR-DERIVED SEPARATION ASSURANCE SYSTEMS IN MULTIPLE AIRCRAFT ENVIRONMENT.
Interim rept. no. 1,
by R. D. Joy, D. E. Killham, and L. K. Belden. Oct 64, 239p
Contract FA WA4598, Proj. 247 001 01C
SRDS RD-64-138

Unclassified report

Descriptors: (*Aircraft, Separation), (*Commercial airplanes, Electronic equipment), (*Air traffic, Safety), Air traffic control systems, Airborne, Position finding, Range finding, Velocity, Transponders, Computers, Simulation, Crystal oscillators, Acceleration, Flight.

This report describes (1) analytical studies of three types of air-derived separation assurance (ADSA) techniques, (2) specifications of simulated aircraft environments to be recorded by the National Aviation Facilities Experimental Center, and (3) a computer program which simulates the performance of ADSA techniques under lifelike conditions. The results of the analytical studies are: Measurement errors in the synchronized airborne oscillator (SAO) range-altitude (R-A) system caused less degradation of performance than those of the ground-bounce R-A and the interrogator-transponder relative position-velocity (RP-V) systems. Medium quality crystal oscillators can be used in the SAO. Rectilinear accelerations occur for such a short period of time that they cause no serious detrimental effects. The tau criterion can offer complete protection in unaccelerated flight. In turning flight, the normal velocity criterion of the RP-V system is completely unsatisfactory and should be eliminated during turning maneuvers. Of the three systems, the SAO resulted in less critical situations in turns, but still did not offer adequate protection. (Author)

How To Use Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown below.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
AD-608 206 DIV. 25

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and division number. A typical subject index entry is shown on the next page.

*COMBUSTION
OSCILLATION
INTENTIONAL COMBUSTION
OSCILLATIONS IN PROPULSION
SYSTEMS
AD-608 206 DIV. 25

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Division numbers and titles are also listed. Again, three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*BENDAT, JULIUS S.
* * *
ZERO CROSSINGS OF A SINE
WAVE PLUS RANDOM NOISE
AD-608 019 DIV. 15
* * *
SPECTRA AND AUTOCORRELATION
FUNCTIONS FOR FULLY DEVELOPED
SEAS AND PREDICTION OF STRUCTURAL
FATIGUE DAMAGE
AD-608 464 DIV. 2

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and division number.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 500
LINCOLN LAB MASS INST OF TECH
LEXINGTON
LL TR 365
(ESD TDR64 378)
AD-608 272 DIV. 30
LL 1964 63
(ESD TDR64 566)
AD-608 288 DIV. 8

AD-DIVISION INDEX

The AD-Division Index is arranged numerically by AD number and lists the subject division where the full entry can be located in TAB.

SUBJECT INDEX

•AAARRRGON
REACTION KINETICS
THIRD-AND FOURTH-ORDER INTERACTIONS OF ARGON WITH A GRAPHITIZED CARBON BLACK.
AD-612 347 DIV. 4

•ABLATION
NOSE CONES
ABLATION EXPERIMENTS WITH PLASTICS AT HYPERSONIC SPEEDS AND AT LOW HEAT-TRANSFER RATES.
AD-612 269 DIV. 9

•ABNORMAL PSYCHOLOGY
LEARNING
LEARNING THEORY AND CLINICAL PSYCHOLOGY.
AD-612 126 DIV. 28

•ABSORPTION
NEUTRINOS
REPRINT: NEUTRINO OPACITY. II. NEUTRINO-NUCLEON INTERACTIONS.
AD-612 434 DIV. 20

PHOTONS
AN ESTIMATE OF THE ABSORPTION MEAN FREE PATH FOR A PHOTON IN A GAS.
AD-611 576 DIV. 25

•ABSORPTION SPECTRUM
NITROGEN COMPOUNDS
REPRINT: ABSORPTION SPECTRUM OF NO2 IN THE 3700-4 600 A REGION.
AD-611 623 DIV. 25
TOTAL ABSORPTANCE OF NO NEAR 5.3 MICRONS USING N2 AS A PRESSURE BROADENING GAS.
AD-612 176 DIV. 2

•ABSORPTION (BIOLOGICAL)
MATHEMATICAL ANALYSIS
REPRINT: MATHEMATICAL ANALYSIS OF SODIUM REABSORPTION IN PROXIMAL PART OF NEPHRON IN PRESENCE OF NONREABSORBED SOLUTE.
AD-612 002 DIV. 16

PERITONEUM
REPRINT: KINETICS OF PERITONEAL FLUID ABSORPTION IN ADULT MAN.
AD-611 985 DIV. 16

•ABSTRACTING
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TRANSDUCER INFORMATION CENTER: QUARTERLY ACCESSION LIST 7.
AD-611 554 DIV. 30

•ACCELERATION TOLERANCE
HUMAN ENGINEERING
REPRINT: MECHANICAL IMPEDANCE AS A TOOL IN RESEARCH ON HUMAN RESPONSE TO ACCELERATION.
AD-611 946 DIV. 16

•ACHIEVEMENT TESTS
PERFORMANCE (HUMAN)
REPRINT: CONFIDENCE, CORRECTNESS, AND DIFFICULTY WITH NON-PSYCHOPHYSICAL COMPARATIVE JUDGMENTS.
AD-611 979 DIV. 28

•ACOOOUSTIC PROPERTIES
NOISE GENERATORS
THE FIELD OF CERTAIN ACOUSTIC RADIATORS.
AD-612 280 DIV. 25

•ACOUSTIC EQUIPMENT
SOUND TRANSMISSION
OPTIMIZATION OF THE BACK-TO-FRONT SUPPRESSION AND FREQUENCY BANDWIDTH RELATIONSHIP FOR THREE-DIMENSIONAL ACOUSTIC ARRAYS.
AD-612 093 DIV. 25

•ACOUSTIC PROPERTIES
EAR
REPRINT: MEASUREMENT OF THE DISPLACEMENTS AND NON LINEARITIES OF THE GUINEA-PIG TYMPANUM.
AD-611 719 DIV. 16

•ACOUSTICS
CRYSTALS
REPRINT: SIMPLE METHOD FOR OBSERVING AUDIOFREQUENCY RESONANCES AND SOUND BEAMS IN CRYSTALS.
AD-611 692 DIV. 25

THERMODYNAMICS
EFFECT OF WALL TEMPERATURE ON THE OPERATION OF THE RIJKE TUBE.
AD-612 249 DIV. 25

•ACRYLIC RESINS
ABSORPTION SPECTRUM
REPRINT: ELECTRONIC SPECTRA OF POLY (METHYL METHACRYLATE) ANIONS.
AD-611 624 DIV. 14

RADIATION DAMAGE
EPR INVESTIGATION OF RADIATION PROTECTION BY AROMATIC ADDITIVES IN SYNTHETIC POLYMERS.
AD-611 779 DIV. 14

SYNTHESIS (CHEMISTRY)
REPRINT: POLYMERIZATION OF METHYL METHACRYLATE INITIATED BY 1, 1-DIPHENYLHEXYL LITHIUM.
AD-611 644 DIV. 14

•ADAPTIVE CONTROL SYSTEMS
DIFFERENTIAL EQUATIONS
REPRINT: REAL-FREQUENCY STABILITY CRITERIA FOR LINEAR TIME-VARYING SYSTEMS.
AD-611 742 DIV. 15

•ADJUSTMENT (PSYCHOLOGY)
ARCTIC REGIONS
REPRINT: PERSONALITY FACTORS IN THE SELECTION OF CIVILIANS FOR ISOLATED NORTHERN STATIONS.
AD-611 989 DIV. 23

LEARNING
LEARNING THEORY AND CLINICAL PSYCHOLOGY.
AD-612 126 DIV. 28

•ADRENAL GLANDS
AMINES
UPTAKE OF DOPAMINE BY THE STORAGE GRANULES OF THE ADRENAL MEDULLA IN VITRO.
AD-611 480 DIV. 16

•ADRENOCORTICOTROPIC HORMONES
BLOOD CHEMISTRY
REPRINT: BLOOD LEVELS OF ACTH IN INDIVIDUAL ADRENALECTOMIZED RATS.
AD-611 703 DIV. 16

•AERODYNAMIC CHARACTERISTICS
HANDBOOKS
AERODYNAMICS HANDBOOK FOR PERFORMANCE FLIGHT TESTING.
AD-612 181 DIV. 1

•AERODYNAMIC CONTROL SURFACES
AERODYNAMIC CONFIGURATIONS
EXPERIMENTAL INVESTIGATION INTO THE SHAPE OF THRUSTAUGMENTING SURFACES IN CONJUNCTION WITH COANDA-DEFLECTED JET SHEETS.
AD-611 799 DIV. 9

•AERODYNAMIC LOADING
MATHEMATICAL PREDICTION
TRANSIENT AIRLOADS ON A BODY OF REVOLUTION DUE TO INDICIAL SINKING AT A LARGE ANGLE OF ATTACK.
AD-612 173 DIV. 9

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ATMOSPHERIC MOTION
TRANSLATION OF RUSSIAN RESEARCH: ATMOSPHERIC TURBULENCE AND THE STABILITY OF FLIGHTS IN ZONE OF TROPOPAUSE AND JET STREAMS.
AD-612 366 DIV. 1

NUCLEAR ENERGY
TRANSLATION OF RUSSIAN RESEARCH: ATOMIC ENERGY AND AVIATION: AIRCRAFT NUCLEAR PROPULSION.
AD-612 368 DIV. 21

•AEROSOLS
FILTERS (FLUID)
FILTRATION OF SALT SMOKE FROM CHLORATE CANDLE OXYGEN.
AD-612 185 DIV. 31

•AEROSPACE CRAFT
HUMAN ENGINEERING
REPRINT: MECHANICAL IMPEDANCE AS A TOOL IN RESEARCH ON HUMAN RESPONSE TO ACCELERATION.
AD-611 946 DIV. 16

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PROPOSED MUTUAL DEFENSE AND DEVELOPMENT PROGRAMS FY 19661 FOREIGN AID POLICY OF THE UNITED STATES.
AD-612 364 DIV. 32

•AFTERIMAGES
RETINA
REPRINT: THE PHYSIOLOGICAL LOCUS OF THE SPIRAL AFTER-EFFECT.
AD-611 881 DIV. 16

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(AFOSR 65-0221)
AD-611 600 DIV. 4
(AFOSR 65-0229)
AD-611 601 DIV. 4
(AFOSR 65-0224)
AD-611 602 DIV. 4
(AFOSR 65-0228)
AD-611 603 DIV. 4
(AFOSR 65-0226)
AD-611 604 DIV. 4
(AFOSR 65-0225)
AD-611 605 DIV. 4
(AFOSR 65-0227)
AD-611 606 DIV. 4
(AFOSR 65-0377)
AD-611 731 DIV. 4

•AF AFOSR62 178
INSTITUTE FOR THE STUDY OF METALS UNIV OF CHICAGO ILL
(AFOSR 65-0435)
F AD-612 132 DIV. 25
(AFOSR 3569)
AD-612 234 DIV. 25

•AF AFOSR62 18
FORDHAM UNIV NEW YORK
(AFOSR 65-0374)
AD-611 726 DIV. 4

•AF AFOSR62 189
MIAMI UNIV CORAL GABLES FLA
(AFOSR 65-0322)
AD-611 508 DIV. 15
(AFOSR 65-0316)
AD-611 740 DIV. 15

•AF AFOSR62 290
ILLINOIS UNIV URBANA
(AFOSR 65-0439)
AD-612 314 DIV. 25
(AFOSR 65-0440)
AD-612 315 DIV. 8

•AF AFOSR62 297
INSTITUTE FOR SCIENTIFIC INFORMATION PHILADELPHIA PA
(AFOSR 3154)
AD-611 613 DIV. 32

•AF AFOSR62 266
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
MF 43
(AFOSR 65-0276)
AD-612 079 DIV. 9

•AF AFOSR62 280
MICROWAVE RESEARCH INST POLYTECHNIC INST OF BROOKLYN N Y
(AFOSR 65-0323)
AD-611 742 DIV. 15

•AF AFOSR62 309
RESEARCH TRIANGLE INST DURHAM N C
S 29
(AFOSR 3238)
AD-611 932 DIV. 15
S 28
(AFOSR 65-0342)
AD-612 206 DIV. 15

•AF AFOSR62 348
MASSACHUSETTS INST OF TECH CAMBRIDGE
(AFOSR 65-0324)
AD-612 222 DIV. 15

•AF AFOSR62 351
PURDUE UNIV LAFAYETTE IND SCHOOL OF ELECTRICAL ENGINEERING
(AFOSR 65-0326)
AD-611 935 DIV. 30
CONTROL AND INFORMATION SYSTEMS LAB PURDUE UNIV LAFAYETTE IND
(AFOSR 65-0325)
AD-611 730 DIV. 30

•AF AFOSR62 370
STANFORD UNIV CALIF
(AFOSR 65-0364)
AD-612 352 DIV. 2

•AF AFOSR62 376
OREGON STATE UNIV CORVALLIS
F AD-612 033 DIV. 2

•AF AFOSR62 384
STANFORD UNIV CALIF
(AFOSR 65-0289)
AD-611 616 DIV. 28

•AF AFOSR62 387
CHILE UNIV SANTIAGO
(AFOSR 65-0298)
AD-612 221 DIV. 28

•AF AFOSR62 409
POLYTECHNIC INST OF BROOKLYN N Y
AD-611 615 DIV. 9

•AF AFOSR62 494
INSTITUTE FOR FLUID DYNAMICS AND APPLIED MATHEMATICS UNIV OF MARYLAND COLLEGE
(AFOSR 65-0327)
AD-612 435 DIV. 15

•AF AFOSR62 92
PENNSYLVANIA STATE UNIV UNIVERSITY PARK
(AFOSR 65-0375)
AD-612 204 DIV. 4

•AF AFOSR62 62
CALIFORNIA UNIV LOS ANGELES
(AFOSR 65-0376)
AD-612 220 DIV. 25

•AF AFOSR62-87
DUKE UNIV DURHAM N C
(AFOSR 2869)
AD-612 440 DIV. 25

•AF AFOSR626 64
SLOANE PHYSICS LAB YALE UNIV NEW HAVEN CONN
(AFOSR 65-0416)
AD-612 327 DIV. 25
(AFOSR 65-0437)
AD-612 351 DIV. 25

•AF AFOSR639 64
ELECTRONICS RESEARCH LAB UNIV OF CALIFORNIA BERKELEY
(AFOSR 65-0334)
AD-611 926 DIV. 8

•AF AFOSR73 63
PENNSYLVANIA STATE UNIV UNIVERSITY PARK
(AFOSR 65-0174)
AD-611 497 DIV. 25

•AF AFOSR74 63
DARTMOUTH COLL HANOVER N H
(AFOSR 65-0387)
F AD-611 763 DIV. 25
(AFOSR 65-0400)
AD-612 350 DIV. 25

•AF AFOSR76 63
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES
(AFOSR 65-0175)
AD-611 498 DIV. 25
(AFOSR 65-0176)
AD-611 499 DIV. 25

•AF AFOSR84 63
NORTH CAROLINA UNIV CHAPEL HILL
(AFOSR 4833)
AD-611 931 DIV. 15
(AFOSR 4834)
AD-612 231 DIV. 15
(AFOSR 4835)
AD-612 240 DIV. 15

•AF EOAR62 99
MASSACHUSETTS INST OF TECH CAMBRIDGE
(AFOSR 65-0156)
AD-611 966 DIV. 25

•AF EOAR63 113
INSTITUTE OF OCCUPATIONAL HEALTH HELSINKI (FINLAND) DEPT OF PHYSIOLOGY
(AMRL TR64 131)
F AD-611 805 DIV. 16

•AF EOAR63 27
MILAN UNIV (ITALY)
(AFOSR 65-0365)
F AD-611 762 DIV. 25

•AF EOAR63 33
OXFORD UNIV (ENGLAND)
(AFOSR 65-0417)
AD-612 321 DIV. 8

•AF EOAR63 48
INSTITUT D'OPTIQUE PARIS (FRANCE)
(AFOSR 65-0157)
AD-611 494 DIV. 25

•AF EOAR63 51
BRUSSELS UNIV (BELGIUM)
(AFOSR 65-0419)
AD-612 317 DIV. 25

•AF EOAR63 60
TECHNION -ISRAEL INST OF TECH HAIFA
(AFOSR 65-0356)
AD-612 223 DIV. 15

•AF EOAR64 43
BRUSSELS UNIV (BELGIUM)
(AFOSR 65-0309)
AD-612 318 DIV. 16

•AF EOAR64 5
LUND UNIV (SWEDEN)
(AFOSR 65-0308)

AD-612 319 DIV. 16

•AF EOAR64-7
TRAINING CENTER FOR EXPERIMENTAL AERODYNAMICS RHODE-SAINT-GENESE (BELGIUM)
(AFOSR 65-0352)
F AD-612 407 DIV. 9

•AFOSR241 63
CALIFORNIA UNIV LOS ANGELES
(AFOSR 65-0331)
AD-611 994 DIV. 2

•AFOSR626 64
SLOANE PHYSICS LAB YALE UNIV NEW HAVEN CONN
(AFOSR 65-0112)
AD-611 996 DIV. 25

•AF04 611 10387
ASTRO VAN NUYS CALIF
25156
AD-611 801 DIV. 12

•AF04 611 9972
FIRESTONE FLIGHT SCIENCES LAB CALIF INST OF TECH PASADENA
AD-612 259 DIV. 10
AD-612 260 DIV. 10
AD-612 261 DIV. 10
KECK (W M) LAB OF ENGINEERING MATERIALS CALIF INST OF TECH PASADENA
AD-611 652 DIV. 14

•AF04 694 427
AEROELASTIC AND STRUCTURES RESEARCH LAB MASS INST OF TECH CAMBRIDGE
ASRL TR 131 1
AD-612 172 DIV. 22
ASRL TR 121 1
AD-612 173 DIV. 9

•AF04 694 486
SPACE SCIENCES LAB GENERAL ELECTRIC CO PHILADELPHIA PA
R65SD3
AD-612 049 DIV. 14

•AF04 695 469
AEROSPACE CORP LOS ANGELES CALIF
TOR 469(5540 10) 2
AD-612 195 DIV. 12

•AF08 635 2991
POULTER RESEARCH LABS STANFORD RESEARCH INST MENLO PARK CALIF
AD-611 944 DIV. 25

•AF18 600 1499
STANFORD RESEARCH INST MENLO PARK CALIF
(AFOSR 3666)
AD-612 331 DIV. 20

•AF18 600 479
MINNESOTA UNIV MINNEAPOLIS
(AFOSR 3588)
AD-612 229 DIV. 25
(AFOSR 3589)
AD-612 230 DIV. 25

•AF18 600 967
JAMES FORRESTAL RESEARCH CENTER PRINCETON UNIV N J
(AFOSR 3563)
AD-612 328 DIV. 4
(AFOSR 3579)
AD-612 329 DIV. 17
TP 4301E
(AFOSR 3560)
AD-612 330 DIV. 25

•AF19 604 4981
YERKES OBSERVATORY WILLIAMS BAY WIS
(AFCRL 64-192)
F AD-611 627 DIV. 8

•AF19 604 4989
YERKES OBSERVATORY WILLIAMS BAY WIS
(AFCRL 64-153)
F AD-611 628 DIV. 2

•AF19 604 6168
NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE
(AFOSR 65-0333)
AD-611 936 DIV. 8

•AF19 604 7344
NATIONAL MAGNET LAB MASS INST OF TECH CAMBRIDGE
(AFOSR 65-0166)
AD-611 518 DIV. 25
(AFOSR 65-0165)
AD-611 519 DIV. 25
(AFOSR 3567)
AD-612 325 DIV. 25
(AFOSR 65-0167)
AD-611 520 DIV. 25

•AF19 604 7376
LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y
(AROD 41201)
AD-611 939 DIV. 2

•AF19 604 7399
INSTITUTE OF TECH UNIV OF ST LOUIS MO
SR 5
(AFCRL 64-981)
AD-611 724 DIV. 2

•AF19 604 7400
LINCOLN LAB MASS INST OF TECH LEXINGTON
S AD-611 560 DIV. 20

•AF19 604 8809
ACOUSTICS AND SEISMICS LAB UNIV OF MICHIGAN ANN ARBOR
AD-612 437 DIV. 2

•AF19 628 1688
NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE
(AFCRL 64-934)
F AD-612 074 DIV. 4

•AF19 628 2390
MITRE CORP BEDFORD MASS
W 6353
(ESD TDR-64-630)
AD-611 752 DIV. 8
TM 03930
(ESD TDR-64-150)
AD-611 753 DIV. 20
W 06943
(ESD TDR-64-640)
AD-611 878 DIV. 5
TM 04093/0000/00/0/00
(ESD TDR64-155)
AD-612 076 DIV. 5

•AF19 628 2402
DAYTON UNIV OHIO RESEARCH INST
(AFCRL 64-703)
AD-612 023 DIV. 1

•AF19 628 2490
TUFTS UNIV MEDFORD MASS
TR 8
AD-611 870 DIV. 20

•AF19 628 2778
OREGON STATE UNIV CORVALLIS
DATA REPT. NO. 18
AD-612 180 DIV. 2

•AF19 628 2783
LITTON SYSTEMS INC ST PAUL MINN
2560 SCIENTIFIC REPT. NO.
(AFCRL 65-72)
AD-611 829 DIV. 1

•AF19 628 2799
AMERICAN SCIENCE AND ENGINEERING INC CAMBRIDGE MASS
ASE 759
(AFCRL 64-917)
F AD-611 629 DIV. 2

•AF19 628 2907
UNIVAC BLUE BELL PA
(AFCRL 64 908)
AD-611 809 DIV. 8

•AF19 628 293
CORNELL UNIV ITHACA N Y
(AFCRL 64-898)
F AD-611 808 DIV. 2

•AF19 628 329
GENERAL ELECTRIC CO SYRACUSE N Y
64 GC 0296 G
(AFCRL 64-1007)
F AD-611 630 DIV. 25

•AF19 628 335
GENERAL ELECTRIC CO SYRACUSE N Y ELECTRONICS LAB
R65ELS 26
(AFCRL 65-8)
F AD-611 802 DIV. 6

•AF19 628 3385
TEMPO GENERAL ELECTRIC CO SANTA BARBARA CALIF
RM 64TMP 12
F AD-612 165 DIV. 30
RM 64TMP 14
F AD-612 171 DIV. 30

•AF19 628 3393
AERONUTRONIC NEWPORT BEACH CALIF
U 3033
(ESD TDR-65-170)
F AD-612 156 DIV. 6

•AF19 628 3437
UNITED AIRCRAFT CORP EAST HARTFORD CONN
(ESD TR-65-2)
AD-611 584 DIV. 2
(ESD TR-65-3)
AD-611 585 DIV. 2

•AF19 628 3438
AERONUTRONIC NEWPORT BEACH CALIF
U 3011
(ESD TDR-65-160)
AD-612 091 DIV. 6

•AF19 628 3806
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
SR 1
(AFCRL 64-1023)
AD-612 176 DIV. 2

•AF19 628 382
BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS
BBN 1212
(ESD TDR-65-153)
F AD-611 767 DIV. 5

•AF19 628 3859
RENSSELAER POLYTECHNIC INST TROY N Y
435 27
(AFCRL 65-21)
F AD-612 036 DIV. 8

•AF19 628 3878
AMERICAN SCIENCE AND ENGINEERING INC CAMBRIDGE MASS
ASE 806
(AFCRL 65-3)
F AD-612 282 DIV. 25

•AF19 628 3881
PARAMETRICS INC WALTHAM MASS

(AFCRL 65-74)
F AD-612 024 DIV. 30

•AF19 628 4031
LOWELL TECHNOLOGICAL INST RESEARCH FOUNDATION MASS
(AFCRL 64-1010)
F AD-612 026 DIV. 2

•AF19 628 4086
ATOMICS INTERNATIONAL CANOGA PARK CALIF
AI 65 27
(AFCRL 64-990)
F AD-611 551 DIV. 2

•AF19 628 4360
GENERAL DYNAMICS ASTRONAUTICS SAN DIEGO CALIF
GDA DBE64 067
(AFCRL 65-66)
AD-612 018 DIV. 27

•AF19 628 441
REPUBLIC AVIATION CORP FARMINGDALE N Y
RAC 619 11
(AFCRL 65-50)
F AD-612 284 DIV. 4

•AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
F AD-611 587 DIV. 8
1965 12
(ESD TDR-65-44)
AD-612 150 DIV. 8
1965 7
(ESD TDR-65-33)
AD-612 151 DIV. 6
1965 13
(ESD TDR-65-42)
AD-611 576 DIV. 25
TR 370
(ESD TDR-64-592)
AD-612 152 DIV. 25

•AF29 601 6213
GENERAL DYNAMICS FORT WORTH TEX
FZK 204
(WL TR-64-147)
AD-611 575 DIV. 14
GENERAL DYNAMICS/FORT WORTH TEX NUCLEAR AEROSPACE RESEARCH FACILITY
FZK 203
(WL TR-64-130)
AD-611 561 DIV. 14
FZK 213
(WL TR-64-148)
AD-612 070 DIV. 4
FZK 214
(WL TR-64-149)
AD-612 071 DIV. 20

•AF30 602 2634
FORDHAM UNIV NEW YORK
(RADC TDR-64-101)
F AD-612 034 DIV. 30

•AF30 602 2914
ELECTRO-OPTICAL SYSTEMS INC PASADENA CALIF
EOS 3460 F
(RADC TDR-63-597)
F AD-612 359 DIV. 6

•AF30 602 3046
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF ILLINOIS URBANA
(RADC TR-64-551)
AD-611 536 DIV. 8

•AF30 602 3197
TYCO LABS INC WALTHAM MASS
(RADC TDR-64-485)
AD-612 051 DIV. 25

•AF30 602 3249
RAYTHEON CO WALTHAM MASS RESEARCH DIV
(RADC TR-64-586)
AD-612 059 DIV. 8

•AF30 602 3273
SYLVANIA ELECTRIC PRODUCTS INC WALTHAM MASS
F 3060 1
(RADC TDR-64-463)
F AD-611 632 DIV. 32

•AF30 602 3296
WESTINGHOUSE ELECTRIC CORP YOUNGWOOD PA SEMICONDUCTOR DIV
(RADC TDR-64-490)
AD-611 631 DIV. 8

•AF30 602 3414
GENERAL ELECTRIC CO SYRACUSE N Y
(RADC TR-64-548)
AD-611 829 DIV. 25

•AF30 602 3425
SCIENTIFIC-ATLANTA INC ATLANTA GA
(RADC TR-64-541)
AD-612 058 DIV. 8

•AF33 608 1003
GEORGIA INST OF TECH ATLANTA
AD-611 781 DIV. 26

•AF33 608 1038
ARIZONA UNIV TUCSON
AD-611 782 DIV. 10
AD-612 066 DIV. 12

•AF33 608 1084
COLORADO UNIV BOULDER
AD-612 258 DIV. 13

•AF33 608 1081
MASSACHUSETTS INST OF TECH CAMBRIDGE SCHOOL OF ENGINEERING
AD-612 262 DIV. 13

•AF33 608 1096
OKLAHOMA UNIV NORMAN
AD-612 247 DIV. 25
AD-612 248 DIV. 13
AD-612 249 DIV. 25
AD-612 250 DIV. 25
AD-612 251 DIV. 15

•AF33 608 1097
OKLAHOMA STATE UNIV STILLWATER
AD-611 783 DIV. 25
AD-612 067 DIV. 18

•AF33 608 1115
SAINT LOUIS UNIV MO
AD-611 784 DIV. 2
AD-611 785 DIV. 2
AD-612 065 DIV. 15

•AF33 608 1116
SYRACUSE UNIV N Y
AD-612 264 DIV. 5

•AF33 608 1119
TEXAS NUCLEAR CORP AUSTIN
AD-611 789 DIV. 11
TEXAS TECHNOLOGICAL COLL LUBBOCK SCHOOL OF ENGINEERING
AD-611 788 DIV. 28
AD-611 790 DIV. 9
AD-611 791 DIV. 26
AD-611 792 DIV. 9
AD-612 117 DIV. 15

•AF33 608 1130
TEXAS A AND M UNIV COLLEGE STATION
AD-611 786 DIV. 26
AD-611 787 DIV. 26

•AF33 608 1130
WASHINGTON STATE UNIV PULLMAN
AD-612 263 DIV. 2

•AF33 608 994
PENNSYLVANIA STATE UNIV UNIVERSITY PARK
AD-611 779 DIV. 14

•AF33 608 999
PITTSBURGH UNIV PA
AD-611 780 DIV. 30

•AF33 615 1030
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF METALLURGY
(ML TDR-64-276)
F AD-611 538 DIV. 17

•AF33 615 1099
MINNESOTA UNIV MINNEAPOLIS
(ML TR64-373)
AD-611 810 DIV. 25

•AF33 615 1072
TRW SPACE TECHNOLOGY LABS REDONDO BEACH CALIF
(AL TR-65-22)
AD-611 771 DIV. 25

•AF33 615 1121
DEFENSE METALS INFORMATION CENTER COLUMBUS OHIO
AD-611 845 DIV. 17
DMIC M 199
AD-611 846 DIV. 26

•AF33 615 1124
RADIATION EFFECTS INFORMATION CENTER COLUMBUS OHIO
REIC MAL 84
AD-612 102 DIV. 20

•AF33 615 1150
SPACE SCIENCES LAB GENERAL ELECTRIC CO PHILADELPHIA PA
AD-611 856 DIV. 14

•AF33 615 1199
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
(APL TR-64-147)
F AD-612 189 DIV. 7

•AF33 615 1241
ALLIED RESEARCH ASSOCIATES INC CONCORD MASS
ARA F 257 12
(FDL TDR-64-173)
AD-611 534 DIV. 1

•AF33 615 1271
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y
AD-612 069 DIV. 8

•AF33 615 1398
THERMO ELECTRON ENGINEERING CORP WALTHAM MASS
TE 41 65
(APL TR-65-7)
F AD-612 050 DIV. 8

•AF33 615 1580
INLAND TESTING LABS DAYTON OHIO
AD-611 850 DIV. 7

•AF33 615 1819
TRANSDUCER INFORMATION CENTER BATTELLE MEMORIAL INST COLUMBUS OHIO
TIC AL 7
AD-611 554 DIV. 30

•AF33 615 1949
RAYTHEON CO WALTHAM MASS
S 740
AD-611 831 DIV. 25

•AF33 615 1981
HUGHES AIRCRAFT CO LOS ANGELES CALIF
AD-612 115 DIV. 8

•AF33 616 7389

ANDREW CORP CHICAGO ILL
(ASD TDR-62-976)
AD-612 008 DIV. 7

•AF33 616 7483
RESEARCH AND ADVANCED DEVELOPMENT DIV AVCO CORP WILMINGTON MASS
RAD TR 62 14
(ML TDR-64-82)
F AD-611 772 DIV. 12

•AF33 616 7624
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-611 640 DIV. 2

•AF33 616 8269
IOWA STATE UNIV OF SCIENCE AND TECH AMES
(ARL 64-193)
F AD-612 035 DIV. 15

•AF33 657 10010
TECHNOLOGY INC DAYTON OHIO
(AMRL TR-65-7)
F AD-611 946 DIV. 16

•AF33 657 10601
GENERAL ELECTRIC CO AUBURN N Y
(APL TR-65-8)
F AD-611 535 DIV. 7

•AF33 657 10668
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
LMSC A704576
(APL TR-64-132 P1)
AD-612 014 DIV. 12
LMSC A668845
(APL TR-64-132 P2)
AD-612 015 DIV. 12
LMSC A702684
(APL TR-64-132 P3 V2)
AD-612 016 DIV. 12

•AF33 657 10928
DENVER RESEARCH INST COLO
402
(AMRL TR-64-119)
F AD-612 021 DIV. 16

•AF33 657 11179
ADVANCED ELECTRONICS CENTER GENERAL ELECTRIC Co ITHACA N Y
(AL TDR-64-185)
AD-611 539 DIV. 19

•AF33 657 11203
ALLEGHENY LUDLUM STEEL CORP BRACKENRIDGE PA
(RTD TR-8-112)
AD-611 989 DIV. 26

•AF33 657 11259
SOLAR SAN DIEGO CALIF
(ML TDR-64-294)
S AD-612 061 DIV. 17

•AF33 657 11662
RCA LABS DIV RADIO CORP OF AMERICA PRINCETON N J
(AL TR-65-32)
F AD-612 283 DIV. 14

•AF33 657 8127
ROCKETDYNE CANOGA PARK CALIF
R 3668 4P
(ASD TDR-63-551)
S AD-611 574 DIV. 12

•AF33 657 8439
BELL TELEPHONE LABS INC WHIPPANY N J
(ML TDR-64-224)
AD-612 273 DIV. 8
AD-612 274 DIV. 8

•AF33 657 8912
COLORADO UNIV BOULDER
(ML TDR-64-321)
AD-612 092 DIV. 25

•AF40 600 59 24
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
(AEDC TR-65-98)
AD-612 301 DIV. 25

•AF40 600 63 136
NATIONAL BUREAU OF STANDARDS WASHINGTON D C
(AEDC TR-65-98)
AD-612 301 DIV. 25

•AF41 609 2020
HRB-SINGER INC STATE COLLEGE PA
(PRL TR-64-30)
AD-611 875 DIV. 23

•AF41 657 388 GRANT
JOHNS HOPKINS UNIV BALTIMORE MD
AD-611 916 DIV. 16

•AF49 638 1029
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
(AFOSR 65-0163)
AD-611 968 DIV. 25

•AF49 638 1038
CALIFORNIA UNIV LA JOLLA
(AFOSR 3662)
AD-612 340 DIV. 25

•AF49 638 1099 GRANT
MIAMI UNIV CORAL GABLES FLA
(AFOSR 65-0316)
AD-611 740 DIV. 15

•AF49 638 1106
AERONUTRONIC NEWPORT BEACH CALIF
U 2931
(AFOSR 65-0432)
F AD-612 057 DIV. 10

•AF49 638 1166
RESEARCH AND ADVANCED DEVELOPMENT DIV AVCO CORP WILMINGTON MASS
(AFOSR 65-0169)
AD-611 945 DIV. 25

•AF49 638 1170
ACOUSTICS AND SEISMICS LAB UNIV OF MICHIGAN ANN ARBOR
AD-612 437 DIV. 2

•AF49 638 1188
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
(AFOSR 65-0295)
AD-611 610 DIV. 26

•AF49 638 1207
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y
(AFOSR 65-0317)
AD-611 738 DIV. 15

•AF49 638 1253 GRANT
STANFORD UNIV CALIF
(AFOSR 65-0289)
AD-611 616 DIV. 28

•AF49 638 1271
GAS DYNAMICS LAB PRINCETON UNIV N J
696
(AFOSR 64-1659)
AD-612 287 DIV. 27

•AF49 638 1271 GRANT
GAS DYNAMICS LAB PRINCETON UNIV N J
695
(AFOSR 65-0002)
AD-612 286 DIV. 9

•AF49 638 1274
STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS
SUDAER 211
(AFOSR 64-1832)
AD-612 411 DIV. 9

•AF49 638 1293
RAND CORP SANTA MONICA CALIF
RM 4291 AID
AD-611 758 DIV. 32

•AF49 638 1301
JOHNS HOPKINS UNIV BALTIMORE MD
(AFOSR 65-0235)
AD-611 614 DIV. 25
(AFOSR 65-0372)
AD-611 739 DIV. 4
(AFOSR 65-0236)
AD-611 913 DIV. 4

•AF49 638 1321
MICROWAVE LAB STANFORD UNIV CALIF
ML 1271
(AFOSR 65-0395)
AD-612 224 DIV. 25
ML 1221
(AFOSR 65-0394)
AD-612 225 DIV. 25
ML 1127
(AFOSR 65-0393)
AD-612 342 DIV. 25

•AF49 638 1337
CALIFORNIA INST OF TECH PASADENA
AD-612 217 DIV. 2
SEISMOLOGICAL LAB CALIF INST OF TECH PASADENA
CONTRIBUTION NO. 1260
AD-611 727 DIV. 2
AD-612 212 DIV. 2
AD-612 213 DIV. 6
AD-612 214 DIV. 2
AD-612 216 DIV. 2
CALIFORNIA INST OF TECH PASADENA
AD-612 215 DIV. 2

•AF49 638 1342
ASTRO-ELECTRONICS DIV RADIO CORP OF AMERICA PRINCETON N J
AED R 2640
(AFOSR 65-0430)
F AD-612 175 DIV. 27

•AF49 638 1349
IIT RESEARCH INST CHICAGO ILL
IITRI H6008 5
(AFOSR 65-0338)
F AD-611 815 DIV. 30

•AF49 638 1398
COLUMBIA UNIV NEW YORK
(AFOSR 65-0397)
AD-612 439 DIV. 2

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STANFORD RESEARCH INST MENLO PARK CALIF
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INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS UNIV OF CALIFORNIA SAN DIEGO
AD-612 203 DIV. 2

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PHILCO RESEARCH LABS NEWPORT BEACH CALIF
QLR 64 10
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•AF49 638 1421
MOORE SCHOOL OF ELECTRICAL ENGINEERING UNIV OF PENNSYLVANIA PHILADELPHIA
(AFOSR 65-0424)
AD-612 277 DIV. 32

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PALOMAR OBSERVATORY PASADENA CALIF
(AFOSR 871)
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(AFOSR 50)
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(AFOSR 65-0346)
AD-611 950 DIV. 15

•AF49 638 287
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(AFOSR 65-0347)
AD-611 949 DIV. 15

•AF49 638 42
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(AFOSR 4609)
AD-611 734 DIV. 25
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(AFOSR 65-0345)
AD-612 236 DIV. 15

•AF49 638 452
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(AFOSR 2636)
AD-612 338 DIV. 4

•AF49 638 473
OREGON UNIV EUGENE
(AFOSR 2606)
AD-612 345 DIV. 4

•AF49 638 513
STANFORD UNIV CALIF DIV OF ENGINEERING MECHANICS
(AFOSR 3437)
AD-612 337 DIV. 30

•AF49 638 514
RENSSELAER POLYTECHNIC INST TROY N Y
(AFOSR 3674)
AD-612 335 DIV. 25

•AF49 638 536
ANTIOCH COLL YELLOW SPRINGS OHIO
(AFOSR 208)
AD-611 607 DIV. 16

•AF49 638 541
INSTITUTE FOR FLUID DYNAMICS AND APPLIED MATHEMATICS UNIV OF MARYLAND COLLEGE
(AFOSR 65-0367)
AD-612 239 DIV. 25

•AF49 638 556
ILLINOIS UNIV URBANA
(AFOSR 65-0438)
AD-612 316 DIV. 25

•AF49 638 556 GRANT
ILLINOIS UNIV URBANA
(AFOSR 65-0440)
AD-612 315 DIV. 8

•AF49 638 571
SYRACUSE UNIV N Y
(AFOSR 4623)
AD-611 741 DIV. 15
(AFOSR 65-0349)
AD-611 914 DIV. 15

•AF49 638 574
HARVARD UNIV CAMBRIDGE MASS
(AFOSR 65-0390)
AD-611 909 DIV. 15

•AF49 638 586
NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE
(AFOSR 3439)
AD-612 332 DIV. 8

•AF49 638 589
HARVARD UNIV CAMBRIDGE MASS
(AFOSR 1787)
AD-611 513 DIV. 25
(AFOSR 2639)
AD-612 346 DIV. 25

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CALIFORNIA UNIV BERKELEY
(AFOSR 2765)
F AD-612 127 DIV. 25

•AF49 638 613
MICHIGAN STATE UNIV EAST LANSING
(AFOSR 560)
AD-611 507 DIV. 25
(AFOSR 3581)
AD-612 237 DIV. 25

•AF49 638 620
PHILIPS LABS INC IRVINGTON-ON-HUDSON N Y
(AFOSR 65-0159)
AD-611 501 DIV. 25
CONTRIBUTION NO. 214
(AFOSR 65-0160)
AD-611 510 DIV. 25

•AF49 638 631
COLUMBIA RADIATION LAB NEW YORK
(AFOSR 3201)
F AD-612 131 DIV. 2

•AF49 638 633
MICHIGAN UNIV ANN ARBOR
(AFOSR 594)
AD-611 472 DIV. 15

•AF49 638 641
KENT STATE UNIV OHIO
(AFOSR 65-0366)
F AD-612 040 DIV. 4

•AF49 638 653
ARKANSAS UNIV FAYETTEVILLE
(AFOSR 65-0369)
AD-611 923 DIV. 4

•AF49 638 683
MINNESOTA UNIV MINNEAPOLIS
(AFOSR 3586)
AD-612 336 DIV. 25

•AF49 638 686 GRANT
CALIFORNIA UNIV LOS ANGELES SCHOOL OF MEDICINE
(AFOSR 2286)
AD-611 482 DIV. 16

•AF49 638 690
YALE UNIV NEW HAVEN CONN
(AFOSR 2864)
AD-612 179 DIV. 25

•AF49 638 700
RAND CORP SANTA MONICA CALIF
RM 4366 PR
AD-611 567 DIV. 18
RM 4347 PR
AD-611 818 DIV. 16
RM 4320 PR
AD-611 841 DIV. 30
RM 4458 PR
AD-611 842 DIV. 2
RM 4431 PR
AD-612 053 DIV. 5
RM 4319 PR
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RM 4393 PR
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•AF49 638 717
CALIFORNIA UNIV LOS ANGELES
(AFOSR 2003)
AD-611 492 DIV. 25

•AF49 638 723
WASHINGTON UNIV SEATTLE
(AFOSR 2604)
AD-612 347 DIV. 4

•AF49 638 734
MCMASTER UNIV HAMILTON (ONTARIO)
(AFOSR 3559)
AD-612 238 DIV. 17

•AF49 638 741
OHIO STATE UNIV COLUMBUS
(AFOSR 2833)
AD-612 125 DIV. 28
(AFOSR 2832)
AD-612 126 DIV. 28

•AF49 638 747
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING
(AFOSR 2401)
AD-612 324 DIV. 8

•AF49 638 780
NORTHWESTERN UNIV EVANSTON ILL
(AFOSR 65-0162)
AD-611 493 DIV. 17
(AFOSR 3577)
AD-612 343 DIV. 26

•AF49 638 798
CORNELL UNIV ITHACA N Y
(AFOSR 65-0359)
AD-611 732 DIV. 16

•AF49 638 804
GEORGIA UNIV ATHENS
(AFOSR 2246)
AD-612 195 DIV. 32

•AF49 638 807
MICHIGAN UNIV ANN ARBOR COLL OF LITERATURE SCIENCE AND THE ARTS
03719 9 T
(AFOSR 3434)
AD-612 183 DIV. 2
TN 3
(AFOSR 3432)
AD-612 193 DIV. 2
PROCESS DEVELOPMENTS INC PHILA DELPHIA PA
TN 403719 9 T
(AFOSR 3433)
AD-612 182 DIV. 2

•AF49 638 814
GENERAL ELECTRIC CO PHILADELPHIA PA
(AFOSR TN-60-815)
AD-611 465 DIV. 12
SPACE SCIENCES LAB GENERAL ELECTRIC CO PHILADELPHIA PA
(AFOSR 435)
AD-611 517 DIV. 12

•AF49 638 819
ILLINOIS UNIV URBANA
(AFOSR 384)
AD-612 226 DIV. 25
(AFOSR 3625)
AD-612 341 DIV. 25

•AF49 638 842
SYDNEY UNIV (AUSTRALIA)
(AFOSR TN-60-1379)
AD-611 466 DIV. 20

•AF49 638 884
COOLEY ELECTRONICS LAB UNIV OF MICHIGAN ANN ARBOR
3642 1 T
(AFOSR 488)
AD-612 037 DIV. 30

•AF49 638 936
COLUMBIA RADIATION LAB NEW YORK
CU 1 62 AF 936 PHYSICS
(AFOSR 579)
AD-611 512 DIV. 25

•AF49 638 940
MINNESOTA UNIV MINNEAPOLIS SCHOOL OF CHEMISTRY
(AFOSR 2196)
AD-611 743 DIV. 25
(AFOSR 65-0371)
AD-611 921 DIV. 25

•AF49 638 946
MARTIN MARIETTA CORP BALTIMORE MD
MARTIN RR 60
(AFOSR 64-2909)
F AD-612 022 DIV. 17

•AF61 052 107
PISA UNIV (ITALY)
(AFOSR TN-60-1281)
AD-611 467 DIV. 16
(AFOSR 1248)
AD-611 469 DIV. 16
(AFOSR TN-60-1278)
AD-611 471 DIV. 16
(AFOSR TN-60-1280)
AD-611 473 DIV. 16
(AFOSR TN-60-1284)
AD-611 474 DIV. 16

•AF61 052 16
LEYDEN STATE UNIV (NETHERLANDS)
(AFOSR 1896)
AD-611 514 DIV. 4

•AF61 052 180
OXFORD UNIV (ENGLAND)
(AFOSR 2626)
AD-612 241 DIV. 16

•AF61 052 188
ARMY CHIEF OF STAFF FOR INTELLIGENCE WASHINGTON D C•
(AFOSR 1724)
AD-611 505 DIV. 16

•AF61 052 221
INSTITUTO NACIONAL DE TECHNICA AEROESPACIAL MADRID (SPAIN)
(AFOSR 2498)
AD-611 608 DIV. 10

•AF61 052 244
SUDDEUTSCHE VERSUCHTS-UND FORSCHUNGSANSTALT FUR MILCHWIRTSCHAFT WEIHENSTEPHAN
(AFOSR 1509)
AD-612 243 DIV. 16

•AF61 052 245
QUEEN MARY COLL UNIV OF LONDON (ENGLAND)
(AFOSR 1642)
AD-611 509 DIV. 16

•AF61 052 309
KAROLINSKA INST STOCKHOLM (SWEDEN)
(AFOSR 2088)
AD-611 470 DIV. 16
(AFOSR 2336)
AD-611 475 DIV. 16

•AF61 052 309 GRANT
KAROLINSKA INST STOCKHOLM (SWEDEN)
(AFOSR 3448)
AD-612 235 DIV. 16

•AF61 052 328
NATIONAL ELECTROTECHNICAL INST TURIN (ITALY)
(AFOSR 3767)
AD-611 506 DIV. 7

•AF61 052 347
HEBREW UNIV JERUSALEM (ISRAEL)
(AFOSR 65-0158)
AD-611 484 DIV. 20
(AFOSR 4046)
AD-611 500 DIV. 20

•AF61 052 356
BRUSSELS UNIV (BELGIUM)
(AFOSR 2171)
AD-611 478 DIV. 16
(AFOSR 2172)
AD-611 502 DIV. 16
(AFOSR 2173)
AD-611 504 DIV. 16
(AFOSR 2175)
AD-611 736 DIV. 16
(AFOSR 2174)
AD-611 737 DIV. 16

•AF61 052 388
WEIZMANN INST OF SCIENCE REHOVOTH (ISRAEL)
(AFCRL 65-107)
AD-612 089 DIV. 25
TSN 11
(AFCRL 65-133)
AD-612 294 DIV. 25

•AF61 052 468
UNIVERSITY COLL LONDON (ENGLAND)
(AFOSR 2129)
AD-611 609 DIV. 20

•AF61 052 541
GOTTINGEN UNIV (GERMANY)
PHYSIOLOGICAL INST
(AMRL TR-64-94)
F AD-611 563 DIV. 16

•AF61 052 543
ECOLE NORMALE SUPERIEURE PARIS (FRANCE)
(AFCRL 65-31)
AD-612 090 DIV. 25

•AF61 052 576
TECHNION -ISRAEL INST OF TECH HAIFA
TAE 35
(ARL 65-92)
AD-611 817 DIV. 9

•AF61 052 598
INSTITUT DE RECHERCHES NUCLEAIRES STRASBOURG (FRANCE)
(AFOSR 2932)
AD-612 438 DIV. 20

•AF61 052 640
SYSTEM RESEARCH LTD RICHMOND (ENGLAND)
(AFOSR 65-0292)
AD-611 543 DIV. 28
SYSTEM RESEARCH LTD RESEARCH LABS RICHMOND (ENGLAND)
(AFOSR 65-0291)
AD-611 542 DIV. 28

•AF61 052 680
NORWEGIAN INST OF COSMIC PHYSICS UNIV OF OSLO
(AFCRL 65-57)
AD-611 479 DIV. 2

•AF61 052 683
FORSVARETS FORSKNINGSINSTITUTT KJELLER (NORWAY)
E 45
(RADC TR-65-70)
AD-612 028 DIV. 8

•AF61 052 691
EDWARD DAVIES CHEMICAL LAB UNIVERSITY COLL OF WALES ABERYSTHWYTH
SR 12
(AFCRL 65-135)
AD-612 166 DIV. 4

•AF61 052 73
COPENHAGEN UNIV (DENMARK)
(AFOSR TN-60-1350)
AD-611 511 DIV. 4

•AF61 052 809
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE PARIS (FRANCE)
(AFCRL 65-67)
F AD-612 922 DIV. 2

•AI03819
JOHNS HOPKINS UNIV BALTIMORE MD SCHOOL OF HYGIENE AND PUBLIC HEALTH
AD-611 683 DIV. 16

•AT30 1 1842
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-612 062 DIV. 30

•AT30 1 2098
NATIONAL MAGNET LAB MASS INST OF TECH CAMBRIDGE
(AFOSR 65-0167)
AD-611 520 DIV. 25

•CST7348
COLORADO UNIV BOULDER
AD-611 715 DIV. 8

•DA ARO D31 1246262
TUFTS UNIV MEDFORD MASS DEPT OF CHEMISTRY
AD-612 279 DIV. 4

•DA ARO D31 1246287
CARNEGIE INST OF TECH PITTSBURGH PA
(AROD 3397 5)
AD-611 957 DIV. 25

•DA AROD31 1246409
DUKE UNIV DURHAM N C
(AROD 3581:5)
AD-612 202 DIV. 4

•DA ORD31 124 61681
SOUTH CAROLINA UNIV COLUMBIA
(AFOD 2913-3)
AD-612 207 DIV. 4

•DA ORD31 124 61681
WESTERN RESERVE UNIV CLEVELAND OHIO
(AROD 2890:5)
AD-612 210 DIV. 20

•DA SIG36 039 62G24
COLORADO STATE UNIV FORT COLLINS FLUID DYNAMICS AND DIFFUSION LAB
CER64EJP VAS37
F AD-612 168 DIV. 9

•DA TC44 17761
INSTITUTE FOR AEROSPACE STUDIES UNIV OF TORONTO (ONTARIO)
UTIAS TN 70
(TRECOM TR64 291)
AD-611 759 DIV. 9

•DA04 200AMC659R
STANFORD UNIV CALIF DIV OF ENGINEERING MECHANICS
TR 152
AD-612 009 DIV. 25

•DA11 022ORD3441
HONEYWELL RESEARCH CENTER HOPKINS MINN
(AROD 2884-2)
AD-612 253 DIV. 14

•DA18 108 63AMC154
RESEARCH TRIANGLE INST DURHAM N C
F AD-611 768 DIV. 4

•DA18 108AMC159A
TRACOR INC AUSTIN TEX
TRACOR 64 189 U
F AD-612 360 DIV. 4

•DA18 108AMC209A

WISCONSIN UNIV MADISON
AD-612 010 DIV. 4

•DA18 108CHL7209
CORNELL UNIV ITHACA N Y
AD-611 761 DIV. 16

•DA23 072AMC1682
PLASMA LAB UNIV OF ARKANSAS FAYETTEVILLE
UAPL 19
AD-612 124 DIV. 25

•DA31 124ARO D136
LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y
(AROD 41201)
AD-611 939 DIV. 2

•DA31 124ARO D204
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
IMM NYU 335
(AROD 247 64)
AD-611 812 DIV. 15

•DA31 124ARO D211
PURDUE UNIV LAFAYETTE IND
(AROD 3047-8)
AD-612 205 DIV. 4

•DA31 124ARO D82
ILLINOIS UNIV URBANA
(AROD 3717 2)
AD-611 963 DIV. 4

•DA33 019AMC270Z
CASE INST OF TECH CLEVELAND OHIO DEPT OF METALLURGY
(AMRA CR64-03/1)
AD-611 799 DIV. 14

•DA33 019AMC273Z
CASE INST OF TECH CLEVELAND OHIO DEPT OF METALLURGY
(AMRA CR-64-09/1)
AD-611 800 DIV. 17

•DA36 034ORD3576RD
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ENGINEERING MECHANICS
F AD-612 082 DIV. 25

•DA36 039AMC01461E
INTERNATIONAL RESISTANCE CO PHILADELPHIA PA
AD-612 073 DIV. 8

•DA36 039AMC01476E
TUNG-SOL ELECTRIC INC BLOOMFIELD N J
AD-611 556 DIV. 8

•DA36 039AMC02227E
BELL TELEPHONE LABS INC MURRAY HILL N J
AD-611 591 DIV. 8

•DA36 039AMC03200E
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-611 641 DIV. 25
AD-611 640 DIV. 2
AD-612 062 DIV. 30

•DA36 039AMC03200E GRANT
MASSACHUSETTS INST OF TECH CAMBRIDGE
AD-611 947 DIV. 8
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-611 718 DIV. 8
AD-611 722 DIV. 8

•DA36 039AMC03619E
GENERAL ELECTRIC CO AUBURN N Y
AD-611 565 DIV. 8
GENERAL ELECTRIC CO AUBURN N Y SEMICONDUCTOR PRODUCTS DEPT
AD-611 835 DIV. 26

•DA36 039AMC03629E
HAMILTON STANDARD DIV UNITED AIRCRAFT CORP WINDSOR LOCKS CONN
EBR 156
AD-612 116 DIV. 26

•DA36 039AMC03639E
PIEZO CRYSTAL CO CARLISLE PA
AD-612 103 DIV. 8

•DA36 039SC88940
KEYSTONE CONTROLS CORP NEWARK N J
AD-612 088 DIV. 8

•DA36 039SC86700
GENERAL ELECTRIC CO SCHENECTADY N Y
AD-611 588 DIV. 8

•DA36 039SC86722
GENERAL ELECTRIC CO SCHENECTADY N Y
F AD-611 587 DIV. 8

•DA36 039SC89111
MARINE LAB UNIV OF MIAMI CORAL GABLES FLA
ML 69035
AD-611 892 DIV. 2

•DA49 009AMC969T
ELECTRO-CHEMISTRY LAB UNIV OF PENNSYLVANIA PHILADELPHIA
AD-612 292 DIV. 4

•DA49 009AMC979T
GENERAL ELECTRIC CO WEST LYNN MASS
AD-611 558 DIV. 7

•DA49 177AMC78T
LOCKHEED-CALIFORNIA CO BURBANK CALIF
17790
(TRECOM TR-64-56)
AD-612 011 DIV. 1

•DA49 196XZ091
GENERAL ATOMIC DIV GENERAL DYNAMICS CORP SAN DIEGO CALIF
AD-612 001 DIV. 25

•DA49 196XZ096
STANFORD RESEARCH INST MENLO PARK CALIF
AD-611 590 DIV. 30

•DA49 196XZ205
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF
3 25 64 1
(DASA 1540)
F AD-612 013 DIV. 20

•DA49 196XZ284
RADIATION RESEARCH ASSOCIATES INC FORT WORTH TEX
RRA M42
AD-612 029 DIV. 20
RRA T43
AD-612 030 DIV. 20
RRA T44
AD-612 031 DIV. 20
RRA T45
AD-612 032 DIV. 20

•DA49 186AMC146D
PENNSYLVANIA STATE UNIV UNIVERSITY PARK MINERAL INDUSTRIES EXPERIMENT STATION
AD-612 276 DIV. 7

•DA49 193MD2047
ILLINOIS UNIV URBANA
AD-611 991 DIV. 16

•DA49 193MD2129
TENNESSEE UNIV KNOXVILLE
AD-611 693 DIV. 16

•DA49 193MD2143
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
1187 11
F AD-611 639 DIV. 16

•DA49 193MD2216
KENT STATE UNIV OHIO
AD-611 695 DIV. 16

•DA49 193MD2238
MARYLAND UNIV COLLEGE PARK
(TT 65-61793)
AD-611 854 DIV. 16

•DA91 591EUC2386
OSSERVATORIO GEOFISICO SPERIMENTALE TRIESTE (ITALY)•
AD-612 219 DIV. 2

•DRB9425 07
MANITOBA UNIV WINNIPEG
AD-611 989 DIV. 23

•DRB9912 20
EATON ELECTRONICS RESEARCH LAB MCGILL UNIV MONTREAL (QUEBEC)
AD-611 964 DIV. 25

•FA WA4321
SIERRA RESEARCH CORP BUFFALO N Y
TR 0384
(FAA RD-64-18)
F AD-611 770 DIV. 1

•FA WA4559
BENDIX CORP SOUTHFIELD MICH
(SRDS RD-64-102)
F AD-611 811 DIV. 19

•FA WA4598
COLLINS RADIO CO CEDAR RAPIDS IOWA
(SRDS RD-64-138)
AD-612 363 DIV. 33

•FA WA4644
TRAVELERS RESEARCH CENTER INC HARTFORD CONN
(SRDS RD-64-147)
F AD-611 816 DIV. 1

•FA WA4680
AIRBORNE INSTRUMENTS LAB DEER PARK N Y
AIL 3523 1
(SRDS RD-64-131)
F AD-612 362 DIV. 19

•FAA BRD376
HAZELTINE ELECTRONICS DIV HAZELTINE CORP LITTLE NECK N Y
10143
F AD-612 423 DIV. 19

•FAA BRD420
STANFORD RESEARCH INST MENLO PARK CALIF
(FAA RD-64-111)
F AD-612 292 DIV. 33

•GRANT AF AFOSR62 280
ILLINOIS UNIV URBANA
(AFOSR 65-0438)
AD-612 316 DIV. 25

•GRANT AF AFOSR62 421
CALIFORNIA INST OF TECH PASADENA
AD-612 215 DIV. 2

•GRANT CAFAFOSR499 64
NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE
(AFOSR 65-0333)

AD-611 936 DIV. 8

•GRANT NSF GP1137
SYRACUSE UNIV N Y
AD-612 269 DIV. 5

•GRANT PHS CA04936 06
PURDUE UNIV LAFAYETTE IND
(AROD 3047-8)
AD-612 209 DIV. 4

•NAS C76320
NAVAL RESEARCH LAB WASHINGTON D C
NRL 6213
AD-612 096 DIV. 25

•NASA NGR05 002 028
CALIFORNIA INST OF TECH PASADENA
AD-612 432 DIV. 20
AD-612 433 DIV. 2
AD-612 434 DIV. 20

•NASB 1949
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y
(AFOSR 65-0317)
AD-611 738 DIV. 15

•NIH AI01672
COLUMBIA UNIV NEW YORK COLL OF PHYSICIANS AND SURGEONS
AD-611 653 DIV. 16

•NIH AM7979
ARMED FORCES INST OF PATHOLOGY ARMY MEDICAL CENTER WASHINGTON D C
AD-611 673 DIV. 16

•NIH AP00208
JOHNS HOPKINS UNIV BALTIMORE MD
AD-611 916 DIV. 16

•NIH AG 066
CALIFORNIA UNIV LOS ANGELES
AD-611 703 DIV. 16

•NIH HE09268
JOHNS HOPKINS UNIV BALTIMORE MD SCHOOL OF HYGIENE AND PUBLIC HEALTH
AD-611 716 DIV. 16

•NIH HE09268
JOHNS HOPKINS UNIV BALTIMORE MD SCHOOL OF HYGIENE AND PUBLIC HEALTH
AD-611 650 DIV. 16
AD-611 717 DIV. 16
AD-611 683 DIV. 16

•NIH NB03590
INSTITUTE FOR BEHAVIORAL RESEARCH SILVER SPRING MD
AD-611 958 DIV. 16

•NOBSR72627
DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN
241
AD-611 721 DIV. 25

•NOBSR89266
AMERICAN MACHINE AND FOUNDRY CO GREENWICH CONN
F AD-611 940 DIV. 21

•NOBSR89229
ELECTRICAL ENGINEERING RESEARCH LAB UNIV OF ILLINOIS URBANA
RRL 207
AD-612 188 DIV. 8

•NOBSR89427
HUGHES AIRCRAFT CO FULLERTON CALIF
FR 65 14 36
AD-611 582 DIV. 8

•NOBSR89492
HUGHES AIRCRAFT CO OCEANSIDE CALIF
AD-611 559 DIV. 8

•NOBSR89463
MICROWAVE ASSOCIATES INC BURLINGTON MASS
F AD-611 849 DIV. 8

•NOBSR89504
WARNECKE ELECTRON TUBES INC DES PLAINES ILL
AD-612 077 DIV. 8

•NOBS78844
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
WERL 8844 2
AD-611 569 DIV. 25

•NOBS78875
CLAPP (WILLIAM F) LABS INC DUXBURY MASS
13091
F AD-611 578 DIV. 26

•NOBS90268
OLIN MATHIESON CHEMICAL CORP NEW HAVEN CONN
AD-611 879 DIV. 14

•NOBS92060
UNITED STATES RUBBER CO WAYNE N J RESEARCH CENTER
AD-612 271 DIV. 4

•NOBS92081
AEROSPACE RESEARCH CENTER GENERAL PRECISION INC LITTLE FALLS N J
AD-611 537 DIV. 4

•NONR 000043 63
TUFTS UNIV MEDFORD MASS DEPT OF GEOLOGY
F AD-611 562 DIV. 2

•NONR 000094 64
TOKUGAWA INST FOR BIOLOGICAL RESEARCH TOKYO (JAPAN)
AD-612 289 DIV. 16

•NONR 22529
STANFORD UNIV CALIF DIV OF ENGINEERING MECHANICS
AD-611 681 DIV. 25

•NONR1076 00
DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF
LB 31183A
(AD 296 530 SUPERSEDED)
AD-612 072 DIV. 1

•NONR110023
PURDUE UNIV LAFAYETTE IND SCHOOL OF AERONAUTICAL AND ENGINEERING SCIENCES
TR 24
AD-611 634 DIV. 25

•NONR1228 26
NORTHWESTERN UNIV EVANSTON ILL
TR 16
AD-611 755 DIV. 20

•NONR122806
NORTHWESTERN UNIV EVANSTON ILL
F AD-612 096 DIV. 25

•NONR122810
NORTHWESTERN UNIV EVANSTON ILL TECHNOLOGICAL INST
ONR RM 96
AD-612 186 DIV. 15
RM 110
AD-612 187 DIV. 22

•NONR122826
NORTHWESTERN UNIV EVANSTON ILL
TR 10
AD-611 754 DIV. 2

•NONR122829
NORTHWESTERN UNIV EVANSTON ILL
F AD-612 096 DIV. 25

•NONR122833
NORTHWESTERN UNIV EVANSTON ILL
TR 2
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611 976	16
611 977	28
611 978	28
611 979	28
611 980	16
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611 998	15
611 999	28
612 000	28
612 001	25
612 002	16
612 003	16
612 004	16
612 005	10
612 006	9
612 007	1
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612 009	25
612 010	4
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OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index

1. Aircraft and Flight Equipment

Patent 3,166,644 Div. 1, 7

MULTIPLE PUSH BUTTON ELECTRICAL SWITCH APPARATUS.
Patent assigned to Navy,
by John W. Feldmayer. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electrical switches), (*Electrical switches), Patents), Aircraft equipment, Circuits, Electric connectors, Wiring diagrams.

The switch apparatus is associated with aircraft instrumentation. Switch apparatus is provided in which the push bottons are divided into two rows mechanically interconnected so that depressing any push button in one row prevents depressing certain push buttons in the other row, in which depressing any one push button in either row releases any other depressed push button in the same row, and in which the depressing of release buttons associated with both rows clears the respective row of any depressed push button.

Patent 3,167,050 Div. 1

EMERGENCY SIGNALING DEVICE.
Patent assigned to Navy,
by Glenn C. Johnson. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Markers), (*Markers, Patents), (*Rescue kits, Markers), Smokes, Flares, Aviation accidents, Ditching, Survival.

The signaling device is a smoke or illuminating signal for use by aircraft personnel in an emergency. Two containers are pivotally connected together. One container has a smoke composition and the other a flare composition. A primer is positioned on each of the containers and is ignited by a striker assembly.

Patent 3,168,827 Div. 1

AIRPLANE TAKE-OFF PERFORMANCE INDICATOR.
Patent assigned to NASA,
by Frederick J. Bailey and Joseph W. Westmore.
9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight instruments), (*Flight instruments, Patents), (*Take-off, Flight instruments), Aircraft engines, Malfunctions, Monitors.

A single-dial direct information source is presented to the pilot of an aircraft of the net thrust of the aircraft during take-off, taking into account not only the engine output, but also compensating for any retarding forces that may act as a drag on the aircraft. The indicator dial is associated with a rack, gear, and weight which are moved by the moveable wall of a spring bellows. Total pressure is introduced into the bellows.

Patent 3,169,001 Div. 1

AIRCRAFT WHEEL SPRAY DRAG ALLEVIATOR.
Patent assigned to NASA,
by Walter B. Horne. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Landing gear), (*Landing gear, Patents), (*Fairings, Landing gear), Sprays, Deflection, Drag, Aircraft equipment.

The wheel spray drag alleviator is in the form of a deflector on landing gear of the four-wheel bogie type. The deflector plates are connected to the bogie landing gear in such a way that the front wheel fluid spray or slush is prevented from impinging on the rear wheels of the landing gear.

Patent 3,169,003 Div. 1

EJECTION SEAT APPARATUS.
Patent assigned to Navy,
by Cecil A. Glass. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ejection seats), (*Ejection seats, Patents), Catapults, Rocket propulsion, Pilot seats.

The rocket propelled pilot ejection seat is of the type which is initially ejected from a catapult tube by pressurized gas. The catapult apparatus has 'hard' or high initial acceleration starts. The gas is formed by the firing of a propellant.

2. Astronomy, Geophysics and Geography

Patent 3,164,905 Div. 2

UNIVERSAL TRACING TABLE.
Patent assigned to Interior,
by Charles L. Pillmore and Robert H. Morris.
12 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Stereoscopic map plotters), (*Stereoscopic map plotters, Patents), (*Mapping, Photogrammetry), Map projection, Design.

A tracing table is provided having a platen, with a particular arrangement of illuminated markings to enable direct and accurate measurements to the thickness of dipping or sloping strata visible in a three-dimensional image projected on a platen. The support for the platen connects it to the tracing table for tilting movement relative thereto. The table has particular utility in photogrammetric apparatus for making contour maps.

PB-166 805 Div. 2, 13, 32
CFSTI Prices: HC$1.00 MF$0.50

Colorado State Univ., Fort Collins. Research Foundation.
SOIL AND WATER ABSTRACTING PROJECT.
Progress rept.,
by R. Howard Porter, William W. Sayre, Kenneth D. Olson, and Herman M. Weisman. Apr 60, 20p
Grant NSF G9457
Unclassified report

Descriptors: (*Soils, Information retrieval), (*Agriculture, Soils), (*Water supplies, Information retrieval), Irrigation systems, Documentation, Indexes, Abstracting, Libraries.

The major purpose of the project is to implement a means for providing a world-wide coverage in the form of abstracts of the pertinent literature dealing with solid and water. The report outlines the eight objectives of the proposed indexing program, describing sources of information on soil and water presently available, and indicating the efforts being made to coordinate this information into an effective bibliographic service.

PB-166 808 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Weather Bureau, Washington, D. C.
MARINE AUTOMATIC METEOROLOGICAL OBSERVING SYSTEM.
Meteorological engineering rept.,
by Nelson M. Seese. Jan 65, 21p MER-13
Unclassified report

Descriptors: (*Weather stations, Moored buoys), (*Marine meteorology, Weather stations), Meteorological instruments, Automatic, Weather communications, Data transmission systems, Meteorological parameters, Weather forecasting, Mexico Gulf.

This report describes briefly the construction and operation of the MAMOS or Marine Automatic Meteorological Observing System. With its associated shore station, the MAMOS buoy comprises a completely automatic and unattended system for obtaining weather data from remote or sparsely traveled ocean areas. (Author)

PB-166 823 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

Navy Electronics Lab., San Diego, Calif.
ACOUSTIC SOUNDING OF QUATERNARY MARINE SEDIMENTS OFF POINT LOMA, CALIFORNIA.
Research rept. for Jan-Jun 57,
by D. G. Moore. 27 Nov 57, 19p
Rept. no. NEL-815
AD 205 223 Unclassified report

Descriptors: (*Hydrographic sonar, Marine geology), (*Ocean bottom topography, Pacific Ocean), (*Sedimentation, Pacific Ocean), California, Seacoast, Hydrographic surveying, Maps.

Geological features of the study area which were detected through the use of the Marine Sonoprobe are: (1) Sediment accumulation is greatest in a zone midway across the shelf and at the base of a prominent drowned sea cliff with its base 150 to 160 feet below present sea level. This 30-to-40-foot-thick wedge of sediment at the cliff base probably was deposited as talus and alluvial material while sea level was at a still lower stand. Locally, thick accumulations occur in filled gullies. (2) Fault zones resulting in topographic highs and exposed bedrock on the central part of the shelf act as dams to trap sediments, causing thick deposits on the shoreward side of the fault and only a thin veneer to seaward. (3) Structurally, a simple homoclinal sequence of beds dip seaward in the southern part of the shelf and probably a faulted anticline trends north-south off central Point Loma. This faulting and folding may be associated with a postulated large fault paralleling Point Loma seaward of the drowned sea cliff.

PB-166 838 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Washington, D. C.
SOME PROBLEMS INVOLVED IN THE STUDY OF STORM SURGES,
by D. Lee Harris. Dec 56, 33p Rept. no. R-4
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Marine meteorology, Tides), (*Tides, Marine meteorology), (*Tropical cyclones, Tides), (*Hurricane tracking, Tides), Marine geophysics, Astrophysics, Climatology, Hurricane Tracking, Weather forecasting, Hydrodynamics, Disasters.

The various forces which affect the height of the sea and the response of the sea to these forces are reviewed. An attempt to clarify the interactions among the astronomical, climatological, and meteorological forces involved, reveals that the response to any given force varies from one part of the sea to another, and that a complete separation of the effects produced by the various forces is impossible in the present state of knowledge. Some case studies of the 'storm surge', the effect of a storm on sea level, are presented. A first approximation to the storm surge is obtained by subtracting from the observed sea level accurate predictions of the astronomical and climatological effects on sea level made by a suitable tide machine. The resulting curves give clear indication of a reaction between the normal tides and the storm surge, but this method of treating the data gives a much clearer picture of the effects of the storm than can be obtained by studying only the observed sea level data. (Author)

PB-166 839 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Washington, D. C.
ON THE MAXIMUM INTENSITY OF HURRICANES.
Revised ed.,
by B. I. Miller. Dec 57, 23p Rept. no. R-14
Unclassified report

Revision of rept. dated 3 Jul 57.
See also PB-166 838.

Descriptors: (*Tropical cyclones, Intensity), (*Hurricane tracking, Air mass analysis), (*Marine meteorology, Air mass analysis), (*Air mass analysis, Hurricane tracking), Marine geophysics, Meteorological charts, Meteorological parameters, Weather forecastings, Disasters.

The minimum pressure that can occur within a hurricane is related to the temperature of the sea surface over which it moves. This is done by making certain assumptions and synthesizing an eye sounding, which is used to compute the lowest pressure of the storm. The validity of the computed sounding is tested on eight hurricanes. A series of composite 200-mb. charts is constructed from five of the eight hurricanes which reached great intensity to show one synoptic situation which results in maximum deepening. These are contrasted with a similar series of composite charts prepared for storms which reached only minor intensity. (Author)

PB-166 840 Div. 2
CFSTI Prices: HC$1.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Washington, D. C.
HURRICANE AUDREY STORM TIDE.
Revised ed.,
by D. Lee Harris. Oct 58, 22p Rept. no. R-23

Unclassified report

Revision of rept. dated 8 Sep 58.
Available copy will not permit fully legible reproduction.
See also PB-166 839.

Descriptors: (*Tides, Tropical cyclones), (*Tropical cyclones, Tides), (*Marine meteorology, Tropical cyclones), (*Hurricane tracking, Tides), Disasters, Damage, Seacoasts, Texas, Louisiana, Topography, Hydrodynamics, Weather forecasting.

Because of the large volume of data available on other aspects of this torm, this paper will be restricted to a discussion of the high tides and other data directly related to the high tides.

PB-166 841 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

National Hurricane Research Project, Weather Bureau, Washington, D. C.
CONCERNING THE GENERAL VERTICALLY AVERAGED HYDRODYNAMIC EQUATIONS WITH RESPECT TO BASIC STORM SURGE EQUATIONS,
by Heinz G. Fortak. Apr 62, 74p Rept. no. R-51

Unclassified report

Available copy will not permit fully legible reproduction.
See also PB-166 840.

Descriptors: (*Tropical cyclones, Hydrodynamics), (*Hydrodynamics, Tropical cyclones), (*Tides, Tropical cyclones), (*Marine meteorology, Tropical cyclones), Hurricane tracking, Weather forecasting, Meteorological parameters, Mathematical analysis.

The three-dimensional hydrodynamic equations for an inhomogeneous fluid are used to derive a system of equations for the study of storm surges in an exceptionally complete form. Smoothing over a short time interval leads to the introduction of small-scale turbulent friction tems but guarantees a mathematically defined free surface of continuous slope. However, many of the characteristics of the wind-driven surface waves are retained.

PB-166 842 Div. 2
CFSTI Prices: HC$6.00 MF$1.25

National Hurricane Research Project, Weather Bureau, Washington, D. C.
SURFACE WINDS NEAR THE CENTER OF HURRICANES (AND OTHER CYCLONES).
Revised ed.,
by Howard E. Graham and Georgina N. Hudson.
Sep 60, 205p Rept. no. R-39

Unclassified report

Revision of rept. dated 10 Jul 58.
Available copy will not permit fully legible reproduction.
See also PB-166 841.

Descriptors: (*Tropical cyclones, Air mass analysis), (*Air mass analysis, Tropical cyclones), (*Wind, Tropical cyclones), (*Hurricane tracking, Air mass analysis), Meteorological charts, Marine meteorology, Weather forecasting, Warning systems, Seacoasts, Disasters, Civil engineering.

The purpose of this report is to supply factual data, analyses, and reasonable inferences on the surface winds near the center of large hurricanes. Such data are indispensable to oceanographers concerned with wind-surge relationships, engineers charged with the design of hurricane protective works, and officials responsible for operation of protective works and the development of evacuation plans for hurricane situations. Isotach patterns or some equivalent are indispensable to wind-surge studies, and constitute the most important part of this compendium. While the report deals primarily with winds, pressure analyses of each storm have been included to permit evaluation of the inverted barometer effect in surge studies.

PB-166 843 Div. 2
CFSTI Prices: HC$2.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Washington, D. C.
AN INTERIM HURRICANE STORM SURGE FORECASTING GUIDE,
by D. L. Harris. Aug 59, 29p Rept. no. R-32

Unclassified report

Available copy will not permit fully legible reproduction.
See also PB-166 842.

Descriptors: (*Tropical cyclones, Weather forecasting), (*Weather forecasting, Tropical cyclone), (*Hurricane tracking, Tides), (*Tides, Tropical cyclones), Marine meteorology, Warning systems, Disasters, Damage, Seacoasts, Meteorological charts.

Techniques for the evaluation of the hurricane storm surge problem necessary for the issuance of effective and efficient warnings are discussed in this paper. The forecasting techniques presented are not in general applicable to extratropical storms. Four steps may be recognized in a hurricane storm surge warning procedure: (1) Forecasting the hurricane motion and development. (2) Determining the storm tide which is implied by the hurricane forecast. (3) Determining the practical importance of the storm surge in terms of specific flood depths at particular places. (4) Distributing the warning. This report is concerned primarily with steps 2 and 3.

PB-166 855 Div. 2
CFSTI Prices: HC$3.00 MF$0.75

National Hurricane Research Project, Weather Bureau, Washington, D. C.

METEOROLOGICAL CONSIDERATIONS PERTINENT TO STANDARD PROJECT HURRICANE, ATLANTIC AND GULF COASTS OF THE UNITED STATES,
by Howard E. Graham and Dwight E. Nunn.
Dec 59, 79p Rept. no. R-33
Unclassified report

Available copy will not permit fully legible reproduction.
See also PB-166 843.

Descriptors: (*Tropical cyclones, Weather forecasting), (*Weather forecasting, Tropical cyclones), (*Marine meteorology, Tropical cyclones), (*Tides, Tropical cyclones), Meteorological parameters, Atlantic Ocean, Mexico Gulf, Seacoasts, United States, Warning systems, Civil engineering.

This report was prepared to provide generalized hurricane specifications that are consistent geographically and meteorologically for use in planning, evaluating, and establishing hurricane design criteria for hurricane protection works. The specifications, criteria, procedures, and methods were derived jointly by representatives of the Hydrometeorological Section, U. S. Weather Bureau and the Office of Chief of Engineers, Corps of Engineers. In addition to serving as an example of the application of meteorology to an engineering project, this report contains a climatological synthesis of aspects of hurricanes that is not duplicated elsewhere. The Standard Project Hurricane (SPH) indices were derived for use in selecting the standard project hurricane criteria for specific projects. The SPH index for various places on the United States Atlantic and Gulf Coasts is defined and illustrated. The SPH index is the wind speed and direction pattern with specified dimension spans, and ranges of forward speed and direction of movement for a specific location. The meteorological characteristics and dimensions of the SPH indices are based on analyses of past hurricanes of record.

3. Chemical Warfare Equipment and Materials

Patent 3,167,070 Div. 3

RESPIRATOR WITH POSITIVE AIR SEAL.
Patent assigned to AEC, Unclassified patent
by Leslie Silverman. 26 Jan 65
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective masks), (*Protective masks, Patents), Respirators, Seals (Stoppers).

The respirator or gas mask has rim seals which can be pressurized. The mask is effective in preventing leakage therein of toxic aerosols. A plenum chamber along the periphery of the mask provides the seal. Air under pressure is supplied to the plenum chamber from a small pump. The pump, a motor, a battery and a filter cartridge are carried in a compact unit by the wearer of the mask.

4. Chemistry

CAPE-1130 Div. 4

Oak Ridge Gaseous Diffusion Plant, Tenn.
VACUUM DISTILLATION SYSTEM.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Distillation, Vacuum apparatus), (*Vacuum apparatus, Distillation), Mechanical drawings.

This package contains 20 drawings. For a listing of individual titles see the Engineering Materials List (TID-4100). This system is used in concentrating dilute aqueous solutions of thermally labile solutes at temperatures of 15 to 25C. Concentration ratios of 2 to more than 100 can be obtained depending on solubility and original volume. Air is removed from the system for operation at the vapor pressure of the water condensate (5.3 mm Hg). Four boilers permit simultaneous concentration of four separate solutions at a water removal rate of 770 ml/hr per boiler. Over 99% solute is recovered for a 30:1 concentration of a 0.00002N oxalic acid solution. A mechanical refrigeratic system is used to condense the distillation at 2C. (AEC abstract)

CAPE-1172 Div. 4

Mallinckrodt Chemical Works, St. Louis, Mo.
FLUID BED DENITRATION VESSEL.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Uranium compounds, Laboratory equipment), (*Nitric acid, Recovery), Mechanical drawings.

This package contains 5 drawings. For a listing of individual titles see the Engineering Materials List (TID-4100). This fluidized bed denitration vessel is used to convert molten uranyl nitrate salt to uranium trioxide of controlled particle size range. The recovery of nitric acid values is accomplished in conventional absorption equipment. Vessel details include the instrument control board, off-gas filter, tube bundle, and tube sheet used for heat transfer and gas distribution. (AEC abstract)

5. Communications

Patent 3,167,770 Div. 5, 7

TIME-MULTIPLEX SYSTEM FOR THE DISTRIBUTION OF SERIAL PULSE TIME CODES WITH MICROSECOND SYNCHRONIZATION.
Patent assigned to Air Force,
by Robert H. Doherty and Thomas L. Davis.
26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radio communication systems), (*Radio communication systems, Patents), (*Radio signals, Synchronization (Electronics)), Multiplex, Radio transmitters, Radio transmission, Pulse generators, Radio stations, Wiring diagrams, Radio receivers, Clocks, Timing devices, Distribution, Coding.

A plurality of serial pulse time codes and a plurality of rates with microsecond synchronization are provided

to any number of users by use of a one-way transmission over a single channel radio link. The system may be used in synchronizing clocks, the positioning of high altitude aircraft, the location of thunderstorms, for missile range timing and other uses.

6. Detection

Patent 3,164,832 Div. 6, 8

IF SIDELOBE CANCELLATION.
Patent assigned to Navy,
by Arthur A. Varela. 5 Jan 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar antijamming), (*Radar antijamming, Patents), Radar jamming, Radar antennas, Omnidirectional antennas, Radar signals, Antenna lobes, Phase (Electronics), Mixers (Electronic), Oscillators, Intermediate frequency amplifier, Radar receivers.

The system is for avoiding the deleterious effects of noise modulated CW jamming signals in radar systems. An auxiliary omnidirectional receiver is provided which may be coupled to a radar receiver whereby cancellation of jamming signals is obtained prior to signal detection.

Patent 3,165,734 Div. 6, 25

SCREW NOISE SIMULATION TECHNIQUE.
Patent assigned to Navy,
by Samuel Grodzinsky and Myron N. Kaufman.
12 Jan 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Noise generators), (*Noise generators, Patents), (*Propeller noise, Simulation), Audiofrequency, Audio amplifiers, Band-pass filters, Sound generators, Ship noise, Simulators, Sonar equipment.

The device simulates sounds produced by ships propellers on sonar receivers. A noise generator is provided which divides the audible frequency range into a number of bands and then provides elements to vary the distribution of the noise power output of each band so that the noise generator may be tailored to comply with specifications set up on the basis of a power distribution analysis of the sounds that are desired.

Patent 3,165,736 Div. 6

BINARY TO DIGITAL READOUT AZIMUTH GATING.
Patent assigned to Navy,
by Emanuel Montalvo and Alfred C. Sanders.
12 Jan 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Identification systems), (*Identification systems, Patents), (*Input-output devices, Identification systems), Binary systems, Azimuth gating, Range gating, Target discrimination, Radar equipment, Wiring diagrams.

The azimuth gating system is for use with an IFF system. The circuitry and components are arranged for operator ease in placing the range-azimuth gate on a desired target. A discrimination of targets closely spaced in azimuth is readily accomplished.

Patent 3,165,737 Div. 6

ELECTRONIC ACQUISITION ELECTROMECHANICAL TRACKING RADAR SYSTEM.
Patent assigned to Navy,
by Alfred I. Mintzer. 12 Jan 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar equipment), (*Radar equipment, Patents), (*Target acquisition, Radar equipment), (*Radar tracking, Radar equipment), Automatic, Search radar, Guided missiles, Supersonic flight, Radar targets.

The radar system is for searching and tracking guided missiles and other supersonic speed targets. The system combines the two basic systems of tracking and utilizes the acquisition circuits of the electronic system and the automatic tracking circuitry and apparatus of the electromechanical system.

Patent 3,166,619 Div. 6, 12, 31

METHOD FOR MAKING A TRANSDUCER.
Patent assigned to Navy,
by Forrest E. Coyle. 19 Jan 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Transducers), (*Transducers, Patents), Manufacturing method, Piezoelectric transducers, Piezoelectric crystals, Sonar equipment, Guided missile systems, Guided missile trajectories, Fire control computers, Underwater sound equipment.

High frequency sound waves are absorbed by a batt of loose polyester fibers containing a proper proportion of copper chips distributed through it. A batt of this type formed into a pad and placed to one side of a wave emitting transducer element absorbs the emissions from that side and, consequently, directivity is obtained in that emission is from the free side. The transducer may be a sonar transducer used under water to predict the trajectory of a missile.

Patent 3,166,703 Div. 6

SIMPLIFIED AIDED TRACKING AND COASTING SYSTEM.
Patent assigned to Navy,
by Alfred I. Mintzer. 19 Jan 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar tracking), (*Radar tracking, Patents), (*Radar equipment, Radar tracking), Tracking, Control systems, Voltage, Electric motors, Tachometers, Inverters.

The aided tracking system is used in any type of radar tracking device. The system includes a variable source of potential, an electric motor, a rate tachometer and an inverter. Components are provided for combining an inverted potential of the tachometer with the potential of the variable source and for thereafter energizing the motor.

Patent 3,167,150 Div. 6, 30

RADIATION LEVEL INDICATOR FOR SONAR PROJECTORS.
Patent assigned to Navy,
by Ronald A. Darby, Frank P. Hodges, and William L. Letsch. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25
Descriptors: (*Patents, Test equipment), (*Test equipment, Patents), (*Sonar projectors, Test equipment), Piezoelectric transducers, Test sets, Electroacoustic transducers, Circuits, Display systems.

The sonar projector tester is utilized for testing a sonar transducer located in the hull of a ship. The device can be hand-held during testing. A piezo-electric element is used to convert acoustic output to electrical energy. A read-out circuit displays the output.

Patent 3,167,718 Div. 6, 8

AUTOMATIC FREQUENCY ACQUISITION CIRCUIT.
Patent assigned to Army,
by Donovan C. Davis and Louis A. Ule. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25
Descriptors: (*Patents, Radar tracking), (*Radar tracking, Patents), (*Circuits, Radar tracking), Control systems, Integrators, Radar interference, Automatic, Frequency shift, Feedback.

A system is provided for controlling the output of a double integrator adapted for use in a tracking system. The system includes components applied to the input of the first integrator for causing the output thereof to drift in a given direction such that its output approaches saturation and the output of the second integrator approaches zero voltage output. Also included is a feedback loop connected between the output of the second integrator and the input of the first integrator.

Patent 3,167,738 Div. 6

SEQUENTIAL MATCHED FILTER.
Patent assigned to Navy,
by Everett C. Westerfield. 25 Jan 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Filters (Electromagnetic wave)), (*Filters (Electromagnetic wave), Patents), (*Echo ranging, Filters (Electromagnetic wave)), Sonar signals, Storage, Sonar equipment, Doppler effect, Identification systems, Correlation techniques, Statistical analysis, Noise, Phase shift.

The filter is utilized in an echo-ranging system. The filter accomplishes the proper storage and delay of a reference signal and automatically correlates an input signal, be it a received echo signal or any other type signal, on a statistical basis therewith by use of a unique combination of well known and conventional components which are electronically operated with no moving parts or burdensome structure.

Patent 3,167,765 Div. 6, 8

PHASE-COMPARISON MONOPULSE RADAR.
Patent assigned to Army, Unclassified patent
by Vincent D. Stabilito. 26 Jan 65
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Monopulse radar), (*Monopulse radar, Patents), Target discrimination, Radar antennas, Radar reflections, Phase measurement.

The radar system enables an operator to distinguish between stationary targets and clutter such as vegetation. The radar system involves the transmission of a multi-pulse signal, an antenna system which permits extracting the phase relation between the reflected signals arriving at the antenna thereby creating sum and different signals, an offset local oscillator which provides single side band reception, and a circuit which provides a comparison of the sum and difference signals instantaneous amplitude.

Patent 3,167,768 Div. 6, 8

PRECISION TARGET USING SINGLE SIDEBAND MODULATOR.
Patent assigned to Navy, Unclassified patent
by Harold A. Rosen. 26 Jan 65
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar target position simulators), (*Radar target position simulators, Patents), Radar targets, Simulation, Radar signals, Sidebands, Modulators, Ferrites, Test equipment (Electronics).

A precision, stimulated target is provided for checking radar systems. A signal is fed from the radar directly into the simulated target through a calibrated horn. After leaving the horn the signal passes through a 45 degree gyrator, and then a thruplexer, into a two-gyrator single sideband modulator employing ferrites. Within the modulator an R.F. signal equal in amplitude and opposite in phase to the transmitter leakage is added to the received signal so that the leakage is nulled out, producing at the output of the modulator a single sideband which is free of distortion. This distortion free signal is then fed into the receiver of the radar system.

7. Electrical Equipment

Patent 3,165,631 Div. 7, 24

ELECTROLUMINESCENT GENERATOR.
Patent assigned to Navy,
by Max Solow, Nathaniel L. Coleburn, and Raymond C. Wiley. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electronic flash), (*Electronic flash, Patents), (*Electroluminescence, Generators), High-speed photography, Solid state physics, Electrons, Color centers, Oxides, Aluminum compounds, Zinc compounds, Magnesium compounds, Cadmium compounds, Indium compounds, Gallium compounds, Light pulses.

The pulse of light from the generator is intense and yet of sufficiently short duration for use in ultrahigh speed photography. A solid state device acts as a source of electrons. Certain metal oxides which contain F' centers are utilized. Aluminum, zinc, magnesium, cadmium, indium and gallium oxides are known to have the F' centers which are defects in the crystal lattice.

Patent 3,166,647 Div. 7, 8

BINARY SWITCH KEY.
Patent assigned to Navy,
by Edward C. Bean and Cyrus J. Creveling.
19 Jan 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric switches), (*Electric switches, Patents), (*Switching circuits, Actuators), Coding, Locking fastener devices.

The code key provides an information code pattern for a switching network. The code key is a portable self contained switch setting device employing spring loaded key pins, protected by a retractable skirt and a positive locking plate for securing the pins in either an extended or retracted position, which can be instantaneously neutralized and reset with ease within a matter of seconds while at the same time removing the human factor which is normally incurred in such code information pattern changes.

Patent 3,166,725 Div. 7, 5

BROADBAND TUNING TRANSFORMER PERMITTING INDEPENDENT MATCHING AT ADJACENT FREQUENCIES.
Patent assigned to Commerce,
by Glenn F. Engen. 19 Jan 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Tuning devices), (*Tuning devices, Patents), (*Transmission lines, Tuning devices), Transformers, Impedance matching, Frequency, Broadband.

The tuning device for a transmission line permits an impedance match to be achieved at two or more frequencies simultaneously. A conventional tuner is used to obtain an impedance match at one of the frequencies of interest. A second tuner is then used to adjust for an impedance match at another frequency while retaining the existing impedance match at the first frequency.

Patent 3,169,200 Div. 7

THERMOTUNNEL CONVERTER.
Patent assigned to AEC,
by Fred N. Huffman. 9 Feb 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Thermoelectricity, Patents), (*Patents, Thermoelectricity), Energy conversion, Thermionic emission, Electrodes, Tunneling (Electronic), Oxides, Films.

The thermotunnel converter is for converting thermal energy to electric power. The structure includes a plurality of aligned metal electrodes and oxide film spacers disposed between the electrodes. The spacers are bonded to the electrodes. An arrangement is provided for creating a temperature gradient across the converter from the first to the last electrode. The first and last electrodes are connected to an external load.

PB-166 780 Div. 7, 4
CFSTI Prices: HC$4.00 MF$1.00

Air Force Aero Propulsion Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CHARACTERISTICS OF SEPARATORS FOR ALKALINE SILVER OXIDE ZINC SECONDARY BATTERIES. SCREENING METHODS,
by Alvin J. Salkind, J. J. Kelly, R. C. Shair, H. N. Seiger, and Lloyd M. Cooke. 1962, 148p
AD 447 301

Unclassified report

Descriptors: (*Alkaline cells, Battery separators), (*Battery separators, Life expectancy), Silver compounds, Oxides, Zinc, Electrolytes, Diffusion, Degradation, Oxidizers, Resistance (Electrical), Direct current, Alternating current, Permeability, Tensile properties, Penetration, Stability, Failure (Mechanics), Solubility, Weight, Volume, Armed forces supplies, Performance (Engineering).

Contents:
Dimensional stability
Tensile strength
Electrolyte retention
Pore size determination (water permeability method, electrolyte permeability method)
Electrical resistance (direct current method, alternating current method)
Degradation by soluble silver
Degradation by oxidants and alkaline solutions
Electrolyte diffusion
Silver diffusion
Zinc diffusion
Zinc penetration.

PB-166 809 Div. 7, 4
CFSTI Prices: HC$1.00 MF$0.50

Naval Ordnance Lab., Corona, Calif.
CHEMOELECTRIC ENERGY CONVERSION FOR NONAQUEOUS RESERVE BATTERY SYSTEMS.
Quarterly rept. for Jul-Sep 63.
15 Oct 63, 19p
Task RRRE06017 211 1F009 06 05
NAVWEPS 8172; AD 423 860

Unclassified report

Descriptors: (*Ammonia, Batteries and Components), (*Batteries and Components, Electrochemistry), (*Electrochemistry, Power supplies), (*Energy conversion, Power supplies), (*Thermal batteries, Electrochemistry), Melting, Liquefied gases, Electrodes, Thiocyanates, Lithium alloys, Magnesium alloys, Alkali metal compounds, Electrolytes, Uranium compounds, Vanadium compounds, Oxides, Potassium

compounds, Sodium compounds, Aromatic compounds, Organic nitrogen compounds, Polarographic analysis, Electrolytic cells, Test equipment.

Progress for the quarter is reported on the following projects: Ionic Melt Cell Systems; Electroreduction of Aromatic Nitro Compounds in Neutral Liquid Ammonia Solutions; Ammonia Cell Test Fixture; High Energy-Density Reserve Battery; and Statistical Design of Experiments. This is the first of a series of quarterly reports on electrochemistry projects. Earlier reporting of these subjects appeared in the NOLC series of Foundational Research Projects quarterly reports. (Author)

8. Electronics and Electronic Equipment

OTR-111 Div. 8
CFSTI Price: HC$0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
INTEGRATED CIRCUITRY.
1964 Unclassified report

Descriptors: (*Integrated circuits, Reviews), (*Reviews, Integrated circuits), Reports, Abstracting, Microminiaturization, Electronic equipment, Silicon, Physical properties, Semiconducting films, Semiconductor devices, Circuits, Computer logic, Reliability (Electronics), Amplifiers, Bibliographies.

Significant reports covering the period since 1961 were selected for this study, with reference to earlier works. Government-generated R and D in integrated circuitry has proceeded within the context of certain economic and technical factors. This survey discusses these factors in terms of circuit device design and fabrication, and application to electronic systems. Considerable attention is also paid to current and future areas of Government interest and requirements in integrated circuit components and devices. (Author)

Patent 3,165,697 Div. 8

AUTOMATIC TUNING CIRCUIT FOR A TRANSMITTER CAVITY AMPLIFIER.
Patent assigned to Army,
by Alfred Reich and Dale M. Osterman. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Tuned circuits), (*Tuned circuits, Patents), (*Tuned amplifiers, Tuned circuits), Automatic, Servomechanisms, Radar transmitters.

A servomechanism is used for automatically tuning a cavity used as the amplifier stage of a transmitter such as used in radar. Tuning is by use of a movable plunger and circuitry is provided which maintains a tuned condition in the transmitter when the parameters change either intentionally or unintentionally.

Patent 3,165,701 Div. 8

RADIO-FREQUENCY OSCILLATOR, AMPLIFIER AND CONVERTER.
Patent assigned to Army,
by Lance R. Jacobsen. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Frequency converters), (*Frequency converters, Patents), (*Subminiature electronic equipment, Frequency converters), Oscillators, Antennas, Circuits, Electron tubes, Radiofrequency amplifiers, High frequency, Very high frequency, Ultrahigh frequency.

The radio-frequency converter includes an antenna for receiving radio-frequency signals, an electron discharge device coupled to the antenna for amplifying the received signals, another discharge device to act as a local oscillator, and an L-C tank circuit. The arrangement permits maximum miniaturization of high frequency converters.

Patent 3,166,691 Div. 8

PHASE ERROR CORRECTION CIRCUIT.
Patent assigned to Navy,
by Newman McGee. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Phase control devices), (*Phase control devices, Patents), Phase (Electronics), Errors, Corrections, Circuits, Servo amplifiers, Servomechanisms.

The substitution circuitry for closed loop synchroservo control systems enables electrical removal of servoamplifiers therein for testing and fault determination while still maintaining a closed loop system. The circuitry has less component parts and occupies less space than the servoamplifier circuit it temporarily replaces.

Patent 3,166,726 Div. 8

AUTOMATIC SWEEP TUNING CIRCUIT WHICH MEANS TO CHANGE THE RANGE OF REACTANCE AFTER EACH SWEEP THROUGH A SUB-BAND.
Patent assigned to Navy,
by Garold K. Jensen and James E. McGeogh. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Tuned circuits), (*Tuned circuits, Patents), Relays, Electron tubes, Tuning devices, Capacitors, Anodes (Electron tubes), Automatic.

The automatic tuning circuit has mechanically operative components which are held to a minimum by employing a combination of a stepping relay controlling a plurality of capacitances graduated in size and a variable inductor controlled by an electron tube whose anode current is caused to vary in a sawtooth manner to search for a signal of desired frequency and which is varied to hold a signal found despite variations in the frequency of that signal.

Patent 3,167,661 Div. 8

FAST RECHARGING PULSE GENERATOR.
Patent assigned to Navy,
by Laddie T. Rhodes. 26 Jan 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pulse generators), (*Pulse generators, Patents), Feedback, Circuits, Electronic switches, Diodes.

The fast recovery pulse generator provides a pulse train of very short duration pulses. A switching arrangement is shown for charging and discharging a pulse forming network using a feedback circuit and two terminal four-layer switching diodes.

Patent 3,167,664 Div. 8, 25

FLIP-FLOP USING SILICON CONTROLLED RECTIFIERS.
Patent assigned to Navy,
by Leonard J. Stascavage. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Relaxation oscillators), (*Relaxation oscillators, Patents), Silicon, Control, Rectifiers, Electronic switches, Switching circuits.

A flip-flop is provided having two silicon-controlled rectifiers both having but one common input pulse to control the alternate switching from the conductive to the nonconductive state of a load in series with one of the silicon-controlled rectifiers by successive small pulses applied to a third silicon-controlled rectifier whereby a minimum of power is used since the rectifiers utilized for controlling the switching of the silicon-controlled rectifier in series with the load return to the nonconductive state a short predetermined time after becoming conductive.

Patent 3,167,684 Div. 8

KLYSTRON TUBES.
Patent assigned to Navy,
by Johann R. Hechtel. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Klystrons), (*Klystrons, Patents), Electron optics, Electron beams, Cavity resonators, Focusing, Electrodes, Velocity, Modulation.

A velocity modulated electron tube is provided which has a cathode forming a circular cross sectioned electron beam for flow along a longitudinal axis, an input cavity resonator, and an output cavity resonator. Focusing electrodes are utilized which have the same potential as the cathode.

Patent 3,167,716 Div. 8, 30

PULSE TRAIN GENERATOR FOR PRODUCING ODD OR EVEN NUMBER OF PULSES WITH VARIABLE PULSE SPACING.
Patent assigned to Navy,
by Melvin F. Williams and Alexander F. Thornhill.
26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pulse generators), (*Pulse generators, Patents), Relaxation oscillators, Gates (Circuits), Computer logic.

The pulse train generator is for use in computer circuitry. In the basic embodiment there is a plurality of monostable multivibrators and an odd number of pulses are generated for each trigger signal. The structure in a second embodiment is the same in the basic embodiment but the arrangement provides an even number of pulses in the pulse train per trigger signal.

Patent 3,167,717 Div. 8

PULSE GENERATOR WITH OUTPUT AMPLIFIER CONTROLLED BY RESPECTIVE SEQUENTIALLY PULSED DRIVER-AMPLIFIERS CONTROLLING LEADING AND TRAILING EDGES.
Patent assigned to Navy,
by Martin L. Jones and Abel J. Savage. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pulse generators), (*Pulse generators, Patents), Amplifiers, Trigger circuits, Design.

The generator of fast rise and fall time square wave pulses has a pair of driver-amplifier circuits, an output amplifier tube circuit, a Zener diode and vacuum tube combination, a triode tube and other electric and electronic components. The generator is triggered by trigger pulses coextensive in time with the duration of the output square wave, that develops exceedingly fast rise and fall time leading and trailing edges with a connecting flat top closely approaching a true square wave.

Patent 3,167,724 Div. 8

HOOK TYPE TRANSISTOR RELAXATION OSCILLATOR.
Patent assigned to Navy,
by Lucio M. Vallese. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Relaxation oscillators), (*Relaxation oscillators, Patents), Transitors, Circuits.

The oscillator includes a pair of transistors connected in a circuit configuration designated as a hook common-emitter circuit, an inductance, a resistance, a load impedance, a second resistance, a source of constant potential, a source of constant supply potential and an outlet.

PB-166 856 Div. 8, 5
CFSTI Prices: HC$3.00 MF$0.75

Washington Univ., Seattle. Coll. of Engineering.
ANALYTICAL STUDY OF ELF AND VLF RADIATION FIELDS FROM A HORIZONTAL DIPOLE IN ANTARCTICA,
by H. M. Swarm, D. K. Reynolds, and A. W. Biggs.
Jan 64, 71p Technical rept. no. TR-87
Grant GA33 Unclassified report

Descriptors: (*Dipole antennas, Radio fields), (*Radio communication systems, Feasibility studies), (*Polar regions, Radio communication systems), Extremely low frequency, Very low frequency, Radio waves, Noise (Radio), Whistlers, Ionospheric propagation, Atmospherics.

Results are presented of an analytical study of the extremely low frequency (ELF) and the very low frequency (VLF) radiation fields from a horizontal electric dipole antenna. The purpose of the analytical study is to predict the feasibility of an ELF-VLF system using this antenna in the continent of Antarctica. The physical location of the antenna would be near the United States facility at Byrd Station, where the ice is 14,000 feet thick, or in Ellsworth Land, near the Ski-Hi Station. In the analytical study, the proposed antenna in Antarctica is represented by a simple horizontal dipole. Since the proposed antenna will have a tendency to sink into the ice over a period of several seasons, the analysis will treat the horizontal dipole for various depths of burial in the ice.

9. Fluid Mechanics

PB-166 781 Div. 9
CFSTI Prices: HC$4.00 MF$0.75

Hydrodynamics Lab., Mass. Inst. of Tech., Cambridge.
ENCLOSED ROTATING DISKS WITH SUPERPOSED THROUGHFLOW: MEAN STEADY AND PERIODIC UNSTEADY CHARACTERISTICS OF THE INDUCED FLOW.
Final technical rept.,
by J. W. Daily, W. D. Ernst, and V. V. Asbedian.
Apr 64, 112p Rept. no. R-64-16
Grants DA ORD31 124 61G5, DA ORD31 124G131,
Projs. 59901004, 2500E
AROD 2500-2; AD 443 060
See also AD-278 659. Unclassified report

Descriptors: (*Disks, Rotation), (*Fluid flow, Disks), Vortices, Flow visualization, Reynolds number, Turbulence, Nonequilibrium flow, Torque, Fluid dynamic properties, Boundary layer transition, Pressure, Boundary layer, Velocity, Smokes, Instrumentation.

This is a report of a study of enclosed rotating disks with radial outward throughflow superposed on the fluid motion induced by the disk. The report presents information on the flow mechanics in the axial clearance space between the disk and stationary endwall including mean steady velocity distributions and unsteady periodicities. Also included are data on the interactions between fluid and boundaries as evidenced by torque transmission (disk friction) and by radial pressure gradients. A theoretical analysis is presented to predict the steady state values of torque and pressure distribution and is compared with experimental results. Quantitative measurements of unsteadiness and periodicities which result under some conditions are analyzed and compared with previous smoke visualization data. (Author)

10. Fuels and Combustion

Patent 3,164,504 Div. 10

MONOPROPELLANTS CONTAINING LIQUID FLUOROCARBONS.
Patent assigned to Navy,
by William D. White, Doris M. Chin, and John L. Jones.
5 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Monopropellants), (*Monopropellants, Patents), Metals, Powders, Aluminum, Magnesium, Fluorine compounds, Organic compounds, Mixtures, Halogenated hydrocarbons.

The monopropellant fuel is for underwater missiles. The fuel is a fluid mixture or slurry consisting of a light metal powder such as aluminum and magnesium varying in particle size from about one micron to about 300 microns suspended in a liquid fluorocarbon. The fluorocarbons used are perfluorotributylamine, perfluorocyclic ether, perfluorodimethylcyclohexane, benzotrifluoride, a polymer of trifluorochloroethylene, and mixtures of these compounds.

PB-166 815 Div. 10
CFSTI Prices: HC$2.00 MF$0.50

Combustion Engineering, Inc., Windsor, Conn.
DE-ASHED COAL COMBUSTION STUDY.
Final rept. for May-Oct 64,
by D. J. Frey. Oct 64, 27p
Contract 14 01 0001 417
Unclassified report

Descriptors: (*Coal, Combustion), (*Combustion, Coal), (*Powders, Coal), (*Liquids, Coal), Ignition, Physical properties, Pumps, Conveyors, Grinders, Burning rate, Test methods, Test equipment, Furnaces.

The properties and burning characteristics of low ash coal were evaluated. The base coal was dissolved in a solvent, filtered to remove most of the ash, and heated to recover a portion of the solvent. The physical properties of the de-ashed coal can be altered according to the amount of solvent left in the coal. The de-ashed coal was fired in existing test equipment in both its solid and liquid states, using commercially acceptable procedures for firing heavy oils and pulverized coals. The study included an evaluation of handling and control systems.

PB-166 816 Div. 10
CFSTI Prices: HC$2.00 MF$0.50

Babcock and Wilcox Co., Alliance, Ohio. Research Center.
COMBUSTION TESTS ON A SPECIALLY PROCESSED LOW-ASH LOW-SULPHUR COAL.
Final rept. for May-Jul 64,
by W. L. Sage. Jul 64, 30p
Contract 14 01 0001 418
Unclassified report

Descriptors: (*Coal, Combustion), Solvent extraction, Powders, Liquids, Thermal properties, Viscosity, Chemical analysis, Atomization, Ignition, Sulfur, Combustion products, Heat transfer, Injection.

The purpose of the tests was to determine the burning characteristics of a fuel obtained by a solvent extraction of the combustible matter in coal. The material appears very similar to a high volatile bituminous coal except for a reduction in sulphur and ash content. The ash was high in sodium and titanium compared to the normal range of coal ashes. Thermogravimetric analyses indicate ignition characteristics similar to a high volatile bituminous coal. However, for complete combustion or burnout this fuel

appears to more closely resemble a semi-anthracite. The Hardgrove grindability index is 164, indicating this fuel could be pulverized with low power requirements. Firing tests in the atomized form indicate this material can be pumped and burned in the atomized form provided it is heated to adequate temperatures. Firing tests in the pulverized form indicate this material has ignition characteristics similar to a high volatile bituminous coal. However, the carryover of unburned carbon more closely paralleled those obtained with low volatile bituminous or semi-anthracite coal. (Author)

PB-166 817 Div. 10, 4
CFSTI Prices: HC$2.00 MF$0.50

Consolidation Coal Co., Library, Pa. Research Div.
PIPELINE GAS FROM LIGNITE GASIFICATION. A FEASIBILITY STUDY.
13 Jan 65, 27p Rept. no. R-1
Contract 14 01 0001 415, Proj. 180

Unclassified report

Descriptors: (*Coal gas, Manufacturing methods), (*Chemical engineering, Coal gas), Coal, Distillation, Economics, Economic geology, Mining engineering, Feasibility studies.

Included in the study are: (1) Estimates of lignite reserves in the Dakotas suitable for gasification, and a specific cost estimate of lignite mining; (2) estimates of the cost of producing a satisfactory pipeline gas from lignite using the Consol CO2 Acceptor Process at the rate of 250 million cubic feet per day; and (3) estimates of the gas demand in a five-state area (North and South Dakota, Minnesota, Nebraska, and Iowa) in 1970 and 1975, and of the city-gate price in this same market area. It is concluded that the gasification of lignite is technically feasible and, by 1975, may be economically attractive.

PB-166 819 Div. 10
CFSTI Prices: HC$2.00 MF$0.50

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
HYDROGENATION OF PULVERIZED COAL IN A PLASMA JET.
Final rept. for 29 Mar 62-29 Mar 63,
by Lewis W. Elston and Clyde Orr, Jr. 29 Mar 63, 38p
Contract 14 01 001 228, Proj. A612

Unclassified report

Descriptors: (*Hydrogenation, Coal), (*Coal Hydrogenation), Powders, Plasma jets, Hydrogen, Nitrogen, Chlorine, Water vapor, Gas analysis, Combustion products, Test methods.

This study consisted of an exploration of the techniques required and the products obtained in the treatment of pulverized coal in a plasma flame. Reactive gases to which the coal was exposed included hydrogen, nitrogen, chlorine, and water vapor. The necessary apparatus consisted of commercial plasma torches and a modified, induction-coupled, radio-frequency plasma generator together with reaction chambers, filters, and cold traps for sample recovery. Gas chromatographic analysis of recovered products revealed only small quantities of low boiling hydrocarbons. Unconsumed coal, together with small quantities of tar and water, were the most conspicuous materials recovered. Lump coal and coke were also tested with both types of plasma generating equipment. No products were obtained through hydrogenation that are not directly produced through thermal decomposition of coal, but evidence was obtained that some of these could be hydrogenated further.

PB-166 820 Div. 10
CFSTI Prices: HC$3.00 MF$0.75

Battelle Memorial Inst., Columbus, Ohio.
ASSESSMENT OF POTENTIAL MARKETS FOR LOW-ASH COAL.
Final rept. for Jun-Dec 64,
by Harlan W. Nelson, Glen M. Hein, and Herbert R. Hazard. Dec 64, 70p
Contract 14 01 0001 471

Unclassified report

Descriptors: (*Coal, Economics), (*Distribution (Economics), Coal), Fuels, Consumption, Feasibility studies, Gas turbines, Electrodes, Carbon, Carbon black, Mixtures, Oils.

The objective of the project was to make a technical-economic study of potential markets for the low-ash coal. Chief emphasis was placed on potential markets in the categories of (1) fuel for gas turbines, (2) material for the production of carbon electrodes, (3) source of carbon for other industrial carbon products, and (4) mixtures of low-ash coal with liquid fuels or crude oil. The study was not limited to such potential uses. Major technical problems in the production of low-ash coal appear largely to have been solved successfully by the work of the Spencer Chemical Company. A low-ash coal product has been produced and small samples made available. The characteristics and behavior of the product have not as yet been adequately determined and evaluated. Total potential markets by 1970 are shown as a total of 3,961,000 tons. By 1975 potential markets for the low-ash coal are estimated at 5,970,000 tons, and by 1980, between 8,540,000 tons and 9,170,000 tons for all categories of uses studied.

11. Ground Transportation Equipment

No Entries

12. Guided Missiles

Patent 3,164,222 Div. 12

NON-REUSABLE KINETIC ENERGY ABSORBER.
Patent assigned to NASA,
by Earl W. Conrad. 5 Jan 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Lunar craft), (*Lunar craft, Impact shock), Lunar probes, Vibration isolators, Sheets.

The energy absorbers are used for the soft landing of a vehicle with a cargo enclosure on the moon. The devices are non-reusable. They include a pair of thin sheets that are concentrically wound on a mandrel under controlled tension. The sheets are initially displaced axially relative to each other. End caps engage the ends of the device. The devices form part of the legs for supporting the vehicle.

Patent 3,164,339 Div. 12

MISSILE PROGRAMMER COAST MODE PROVISION.
Patent assigned to Navy,
by Irvin H. Schroader, Melvin E. Hosea, Leo C. Miller, and Frederick F. Hiltz. 5 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Midcourse guidance), (*Midcourse guidance, Patents), (*Guided missiles, Midcourse guidance), Beam-rider trajectories, Programming (Computers), Guidance, Guided missile computers.

The apparatus controls the flight course of a guided missile to a target. It is used in a typical missile guidance and control system for beam-riding missiles. A second order missile programmer computing circuit is provided which embodies coast mode provisions. This enables a programmed missile to coast during periods of target track loss by guidance equipment and thereafter to return to a normal program flight mode.

Patent 3,165,355 Div. 12, 29

UNIVERSAL-FIT ACCELERATION PROTECTIVE DEVICE.
Patent assigned to Navy,
by Lloyd Hitchcock, Jr., and Donald A. Morway.
12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Spacecraft seats), (*Spacecraft seats, Patents), (*Acceleration tolerance, Space flight), Design.

The universal-fit contoured couch is especially useful in aerospace flights. The couch is in the form of a rigid shell contoured into a hollow relief of the head, back and posterior of the occupant. Resilient padding on the rigid contoured backing distributes compressive resistance evenly over the entire load.

Patent 3,165,356 Div. 12

SHOCK ABSORBING SUPPORT AND RESTRAINT MEANS.
Patent assigned to NASA,
by Douglas J. Geier, Gerard J. Pesman, Richard S. Johnston, and Matthew I. Radnofsky. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Manned spacecraft), (*Manned spacecraft, Patents), (*Pilot seats, Manned spacecraft), Vibration isolators, Nets, Bedding.

The couch is for use in space flights. The body support device includes a net or webbing which is attached about its periphery to a rigid framework. Lateral movement restraints in the form of leg and torso restraints are formed of the same net material.

Patent 3,165,889 Div. 12, 27

JET CONTROL BY ROTATABLE OFFSET NOZZLE.
Patent assigned to Navy,
by Richard B. Korshner and Frank H. Swaim.
19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Movable nozzles), (*Movable nozzles, Patents), Flight control systems, Rocket motors (Solid propellant), Rocket motor nozzles, Rocket trajectories, Control.

A plurality of canted nozzles are rotated to control the roll, pitch and yaw attitude of a missile. Four nozzles are mounted on the end cap of the missile. Each nozzle is mounted on bearings and may be rotated to control the flight of the missile.

Patent 3,166,014 Div. 12

SEPARATION MECHANISM.
Patent assigned to Navy,
by Elmer W. Travis. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Clamps), (*Clamps, Patents), (*Guided missiles, Clamps), Separation, Release mechanisms.

The clamp holds the bird section of a missile in tight sealing relationship with the motor section of the missile throughout 360 degrees of contact. The clamp is formed of two identical semi-circular sections and each of these sections is formed of a pair of 90 degree arcuate sections which are hingedly connected. Explosive bolts secure the clamp to the missile.

Patent 3,166,975 Div. 12, 22

MISSILE LAUNCHING SYSTEM.
Patent assigned to Navy,
by Sven Landstrom and Robert E. Carlberg.
26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Guided missile launchers), (*Guided missile launchers, Patents), Shipborne, Loaders, Feed mechanisms, Mechanical drawings.

The system for launching missiles is particularly suited for shipboard use. It includes a magazine and associated hoist and ramming mechanisms by use of which the missiles may be loaded onto the launchers and fired. The installation can fire missiles singly and in salvos.

Patent 3,166,976 Div. 12

LOADER MECHANISM FOR GUIDED MISSILE LAUNCHING SYSTEM.
Patent assigned to Navy,
by Myron J. Bauer, Robert E. Carlberg, and Richard C. Wilson. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Loaders), (*Loaders, Patents), (*Guided missile launchers, Loaders), Feed mechanisms, Ships.

The system is for handling guided missiles on a warship. The feeder mechanism automatically handles and conveys missile weapons, either singly or in pairs from ready service mechanisms to a launcher. The system includes launching guide arms, a floating track, a link chain, a hydraulic device for moving the chain and a rammer.

Patent 3,166,977 Div. 12

STABILIZED WATER-LAUNCHED ROCKET VEHICLE.
Patent assigned to Navy,
by Robert Byron Pickett and John Emery Drain.
26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Launch vehicles (Aerospace)), (*Launch vehicles (Aerospace), Patents, Stabilization systems, Launching, Guided missiles.

The missile can be launched from water. The missile has a stabilizer attached to it and located below the center of gravity of the missile. The stabilizer gives the missile stability in a vertical position. The stabilizer is separated from the missile after the missile is fired and floats to the surface for recovery.

Patent 3,166,978 Div. 12

STOWAGE ADAPTER.
Patent assigned to Navy,
by Wilson T. Price and Shiro Aisawa. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vibration isolators), (*Vibration isolators, Patents), (*Guided missiles (Underwater-to-surface), Storage), Guided missile launchers, Submarines, Plastics.

The stowage adapter prevents shock to guided missiles in stowage position in a launch tube. The missiles are fired from a vehicle such as a submarine. The stowage adapters employ a plastic as a contact with the missile.

Patent 3,166,980 Div. 12, 22

ARMING TOOL MECHANISM.
Patent assigned to Navy,
by Robert M. Harris and Roger H. Wiethoff.
26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Guided missile launchers), (*Guided missile launchers, Patents), (*Arming devices, Guided missiles), Design.

The arming mechanism arms a missile after it is on the launching arm of the missile launching system. The launcher arm is supported directly above the magazine. The missiles are stored in a vertical position. The mechanism is located within the retractable rail of the launcher arm. It mechanically opens and closes circuitry between the missile firing contacts and the rocket ignition squibs for the missile.

Patent 3,166,981 Div. 12

FORWARD MOTION LATCH AND LOCK.
Patent assigned to Navy,
by Robert M. Harris and Richard C. Wilson. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Locking fastener devices), (*Locking fastener devices, Patents), (*Guided missile launchers, Locking fastener devices).

The forward-motion latch and lock is used in a missile launching system in which the missiles are stored in the magazine in a vertical position. The mechanical latch is located in the path of the missile and is engaged by the aft shoe of the missile which arrests the missile until sufficient thrust is provided to overcome a restraining spring. The thrust is used to sustain the missile in flight.

Patent 3,167,294 Div. 12

MISSILE LAUNCHER SHOCK ABSORBER.
Patent assigned to Navy,
by Zenas B. Andrews, Charles R. Brown, and Wilson T. Price. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vibration isolators), (*Vibration isolators, Patents), (*Guided missile launchers, Vibration isolators), Submarines, Guided missiles (Underwater-to-surface), Storage.

The resilient vibration-absorbing device is utilized in missile launching tubes which are used for storing and conveying as well as launching missiles. The tubes comprise an outer and an inner tube in which the missile is positioned. The tube protects the missile from shock generated by the depth charging of a submarine. The system includes a flexure rod assembly, and a vibration-absorbing system to absorb vibrations in a vertical direction.

Patent 3,167,731 Div. 12

MAGNETIC PICK-UP DEVICE.
Patent assigned to Army,
by Charles E. Lee and Richard L. Moore. 29 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Measuring devices (Electrical and Electronic)), (*Measuring devices (Electrical and Electronic), Patents), Magnetic cores, Magnetic coils, Guided missiles, Motion, Measurement, Guidance.

The device is utilized to measure small angular movements of a missile. The structure includes a toroidal

magnetic core, two magnetic bar members, one horizontal and one vertical, a pair of primary windings and a pair of secondary windings. The first bar member has its ends connected to the magnetic core and the second bar member is disposed to form air gaps between its ends and the core. The primary windings are connected in series and the secondary windings are connected in series.

13. Installations and Construction

Patent 3,168,814 Div. 13

AUTOMATIC WATER CONTROL GATE.
Patent assigned to Interior,
by George R. Hurlburt. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Liquid level control), (*Liquid level control, Patents), Irrigation systems, Automatic, Fluid flow, Control systems, Gate valves.

The flow control gate, for installation in an irrigation system, is fully automatic in operation. The gate is pivotally mounted, and the pressure of the upstream water supply is utilized to cause a lifting force on the gate, and to maintain a uniform upstream water elevation in the event of widely fluctuating flow in the upstream channel.

14. Materials (Non-Metallic)

Patent 3,165,508 Div. 14, 4

DEGRADED STARCH POLYOXYALKYLENE ETHER COMPOSITIONS AND PROCESS FOR PRODUCING THE SAME.
Patent assigned to Agriculture,
by Felix H. Otey and Charles L. Mehltretter. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Isocyanate plastics), (*Isocyanate plastics, Patents), (*Starch, Degradation), (*Ethers, Synthesis (Chemistry)), Expanded plastics, Preparation, Alcohols, Ethylene oxide, Glycols, Glycosides, Catalysts, Sulfuric acid, Hydrochloric acid, Phosphoric acid.

The degraded starch glycoside polyoxyalkylene ether compositions are prepared by reacting unmodified starch with polyols such as ethylene glycol, propylene glycol or glycerol under specific temperature conditions in the presence of a strong mineral acid catalyst such as sulfuric acid, hydrogen chloride or phosphoric acid or an aryl sulfonic acid, followed by etherification with 1,2-alkylene oxide selected from the group of ethylene oxide, propylene oxide or mixtures thereof to produce polyethers having reactive hydroxyl groups. The polyethers are used in the preparation of foamed polyurethanes which have an improved resistance to yellowing.

Patent 3,165,715 Div. 14

HIGH PRESSURE SEAL MOUNTING FOR BRITTLE INSTRUMENT.
Patent assigned to Navy,
by William J. Leiss and Edward J. J. Tracey.
12 Jan 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Seals (Stoppers)), (*Seals (Stoppers), Patents), Thermistors, Sealing compounds, Moisture proofing, Shock resistance, High-pressure research.

A seal is provided between two regions at considerably different pressure, around a brittle shaft of a thermistor transversing these regions. The shaft is potted to reduce shock and to hold it fast, thereby eliminating slipping through the seal from the high-pressure region to the low-pressure region. The unique ability of this invention to develop a leakproof and shock-resistant sealing is achieved by having a soft material in intimate contact with the shaft to be sealed at the high-pressure region, an intermediate flexible material in contact at the mid-portion of the shaft, and a relatively hard supporting and sealing substance shaft at the low-pressure region.

Patent 3,167,393 Div. 14

METHOD OF PRODUCING PURE SINGLE CRYSTALS OF GRAPHITE.
Patent assigned to Army,
by Armando A. Giardini and John E. Tydings. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Graphite), (*Graphite, Patents), (*Single crystals, Graphite), Carbon, Solvents, Pressure, Heat treatment, Ammonium compounds, Halides, Phosphates, Chlorides.

The graphite crystals are used in resistance elements in electronics, in liners of rocket engines, in control elements of nuclear reactors and for chemical use. The graphite crystals are prepared by charging a container of carbon with a solvent such as ammonium chloride, subjecting the container to about 60,000 atmospheres of pressure, heating the container to about 1600 C., cooling the container to room temperature and reducing the pressure to normal.

Patent 3,167,447 Div. 14, 20

CARBON BODY TREATMENT.
Patent assigned to AEC,
by Byron F. Disselhorst and Dwight E. Davis. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Carbon), (*Carbon, Patents), (*Porosity, Carbon), (*Reactor fuel elements, Carbon), Viscosity, Polymerization, Aging (Materials), Permeability, Fission products, Pressure, Impregnation.

The carbon bodies are used in nuclear reactors. A carbon body of any suitable size and shape and fabricated in any suitable manner is impregnated. A preferred impregnant is a mixture of furfuryl alcohol and maleic anhydride. The impregnant is cured in the carbon body.

Patent 3,167,514 Div. 14

COMPOSITIONS FOR CLEANING MACHINERY AND ELECTRICAL EQUIPMENT.
Patent assigned to Navy,
by Hayward R. Baker. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Cleaning compounds), (*Cleaning compounds, Patents), Electrical equipment, Machines, Greases, Oils, Films.

The composition is used as an aqueous emulsion for cleaning machinery, electronic equipment, electric motors, and the like. One composition contains 90 percent (by weight) of an aliphatic hydrocarbon, 9.5 percent of turbojet lubricating oil, 0.5 percent of Pluronic L-63, and 50 percent of water by volume.

Patent 3,169,071 Div. 14

COATING COMPOSITION.
Patent assigned to Navy,
by Harry Hochman. 9 Feb 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Antifouling coatings), (*Antifouling coatings, Patents), (*Wood, Protective treatments), Creosote, Germicides, Impregnation, Marine engineering.

The preservative composition is for impregnating wooden structures used in a marine environment. It contains 90 to 99 percent of creosote and 1 to 10 percent of a bacterial agent such as a creosote soluble zinc oxinate.

Patent 3,169,073 Div. 14

HIGH SOLIDS PROTEIN-POLYMERIC DIALDEHYDE COATING COMPOSITIONS.
Patent assigned to Agriculture,
by Francis B. Weakley and Charles L. Mehltretter.
9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Coatings), (*Coatings, Patents), (*Paper, Coatings), Aldehydes, Starches, Clay, Pigments, Cesein, Sodium compounds, Phosphates,

The paper coating composition contains 100 parts (by weight) of clay pigment, 12 to 14 parts of casein, 0.25 to 1.0 part of dialdehyde starch, 24 to 28 parts of urea, 0.2 part of sodium hexametaphosphate, and water.

Patent 3,169,114 Div. 14

LUBRICANTS.
Patent assigned to Phillips Petroleum Co., Corp. of Delaware,
by Bill Mitacek and John P. Graham. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Lubricants), (*Lubricants, Patents), (*Greases, Lubricant additives), (*Polyethylene plastics, Lubricant additives), (*Lubricant additives, Polyethylene plastics), Mineral oils, Stability, Colloids, Manufacturing methods.

A soapless grease thickened with propylene polymers exhibits good work stability and long life under high loads and is suitable for lubricating machinery in the textile, food and automotive industry. To a base lubricating oil, preferably a refined mineral oil, is added a high density propylene polymer in the range of about 0.1 to 20 weight percent of the finished grease having a density between 0.890 and 0.920 gram per cubic centimeter at 25°C. The mixture is cooled with or without agitation and milled at a temperature range from 150 to 245°F.

Patent 3,169,923 Div. 14, 4

OIL OF LUBRICATING VISCOSITY.
Patent assigned to Universal Oil Products Co.,
Des Plaines, Ill.,
by Anthony J. Guarnaccio and Edwin J. Latos. 16 Feb 65
Unclassified patent
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Lubricants), (*Lubricants, Patents), Lubricant additives, Oils, Viscosity, Corrosion inhibition, Greases, Cutting fluids, Organic phosphorus compounds, Amines, Phenols, Alcohols, Ethylene oxide, Phosphorus compounds, Aliphatic compounds, Oxides, Stability.

An amine or diamine salt of a polyoxyalkylenated alkylphenol phosphate is added to lubricating oils, cutting oils, and slushing oils to stabilize lubricity and to inhibit corrosion. Depending upon the lubricant in which it is used, the additive is present in concentration by weight of from 0.01% to 25%. An alkylphenol or aliphatic alcohol is reacted with ethylene oxide in such molar ratios as to produce an oxyalkylenated hydroxyhydrocarbon having from two to twelve oxyalkylene groups. The reaction is effected in a temperature range of 200 to 300 degrees F. The resulting product is reacted at 150 degrees F with phosphorus pentoxide to produce the desired phosphate. (Author)

Patent 3,169,925 Div. 14, 4

HIGH TEMPERATURE LUBRICANTS AND PHOSPHORUS CONTAINING POLYMERS.
Patent assigned to Shell Oil Co., New York,
by Clarence L. Mahoney. 16 Feb 65
Unclassified patent
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Lubricants), (*Lubricants, Patents), Airplane engine oils, Metals, Engines and motors, Organic phosphorus compounds, Heat-resistant materials, Ethers, Polymers, Aliphatic compounds, Loading (Mechanics), Synthesis (Chemistry), Phenols.

A high-temperature lubricant was developed which is useful for the operation of engines, motors and moving metallic elements at high operating temperatures and under high loads. The lubricant contains a major amount of a polyphenyl ether base having from 3 to 8 phenyl rings per molecule and from 0.05% to about 5% by weight of a phosphorus polymer. The phosphorus polymer contains aromatic radicals of the group consisting of phenyl, biphenyl and phenoxyphenyl, each phenyl radical having as substituents on the ring only substituents of the group consisting of hydrogen, tertiary butyl, phenyl, alpha-cumyl and phenoxy radicals.

15. Mathematics

PB-166 753 Div. 15
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MORE ON GAMES OF SURVIVAL,
by M. P. Peisakoff. 20 Jun 52, 24p RM-884
ATI 210 424

Unclassified report

Descriptors: (*Game theory, Optimization), Matrix algebra, Distribution theory, Probability, Operations research.

Let G be the game of survival which is the repetition (until the bankruptcy of one of the players) of a normalized finite zero-sum two-person game, g = (g sub ij), where each g sub ij is a non-zero integer. It is shown that G is inessential and has some easily described optimal strategies, it is also shown that iF max det g sub ij is small enough compared to the combined fortunes, then playing at the nth play a delta to the nth power -optimal strategy for g is an epsilon-optimal strategy for G, if delta is sufficiently small.

PB-166 853 Div. 15, 26, 32
CFSTI Prices: HC$2.00 MF$0.50

Institute for Mathematical Studies in the Social Sciences, Stanford Univ., Calif.
COMPUTING OPTIMAL (s,S) INVENTORY POLICIES,
by Arthur F. Veinott, Jr. and Harvey M. Wagner.
26 Mar 64, 45p Technical rept. no. TR-3
Grants NSF G24064, NSF GP1625

Unclassified report

Descriptors: (*Inventory analysis, Optimization), (*Optimization, Inventory analysis), Model theory, Stock level control, Stochastic processes, Dynamic programming, Costs, Operations research.

A complete computational approach for finding optimal (s,S) inventory policies is developed. The method is an efficient and unified approach for all values of the model parameters, including a non-negative set-up cost, a discount factor 0 less than or = to alpha less than or = to 1, and a lead time. The method is derived from renewal theory and stationary analysis, generalized to permit the unit interval range of values for alpha. Careful attention is given to the problem associated with specifying a starting condition (when alpha < 1); a resolution is found that guarantees and (s,S) policy optimal for all starting conditions is produced by the computations. The special case of linear holding and penalty costs is treated in detail. In the final section, a model in which there is a minimum guaranteed demand in each period is studied, and a simplified method of solution is developed. (Author)

16. Medical Sciences

Patent 3,165,782 Div. 16

APPARATUS FOR CASTING LEG STUMPS.
Patent assigned to Army,
by Henry F. Gardner. 19 Jan 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Medical equipment), (*Medical equipment, Patents), (*Prosthetics, Medical equipment), Manufacturing methods, Castings, Amputation stumps.

A casting fixture is provided which by prosthetic information is able to accurately duplicate the general contours, size and structure of a patient's limp stump and stub socket, insuring proper control of the weight distribution acting on the superficial stump tissues. The apparatus includes a stand assembly with a cross member assembly adjustably mounted on it, an adjustable posterior socket form, an adjustably mounted anterior socket form and a lateral socket form.

PB-166 824 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

Naval School of Aviation Medicine, Pensacola, Fla.
ELECTRON MICROSCOPIC STRUCTURE OF THE INTERCALATED DISCS OF MAMMALIAN CARDIAC MUSCLE,
by James H. Berrian. 15 May 53, 13p
Proj. NM001 057 10 01
AD 17 969

Unclassified report

Descriptors: (*Heart, Tissues (Biology)), Electron microscopy, Muscles, Anatomy, Histology, Cells (Biology), Morphology (Biology), Degradation, Aging (Physiology).

Electron micrographs of intercalated discs in monkey cardiac muscle are figured and described. The intercalated discs completely replace the Z disc structure at the site of occurrence. Variations in the intercalated discs are described. The length of the intercalated disc was observed here to vary between one sixth and one whole sarcomere length. In width the intercalated disc may extend across on entire sarcomere or only across a few myofibrils. Z discs of sarcomeres lengthwise adjacent to each other may be replaced by intercalated discs. From the variation in the structure of the intercalated discs observed they are thought to result from degeneration of the system, having no adaptive value or uselful function. The view is advanced that they represent aging of the system. This view is thought not irreconcilable with the appearance of the discs even in fetal life, since regeneration of the normal Z disc structure is even then restricted by the high degree of differentiation reached in the system. (Author)

PB-166 826 Div. 16
CFSTI Prices: HC$1.00 MF$0.50

California Univ., Berkeley.
RELATIONSHIP OF DIETARY BALANCE OF MACRONUTRIENTS TO RESISTANCE TO LOW DOSES OF WHOLE-BODY RADIATION AS MEASURED BY CHANGES IN BRAIN FUNCTION.
Rept. no. 7(final), 30 Apr 60-29 Apr 62,
by Paola S. Timiras. 29 Apr 62, 19p
Contract DA19 129qm1589, Proj. 7 84 13 002A
DSSC N-1136; AD 292 737

Unclassified report

Descriptors: (*Radiation tolerance, Diet), (*Diet, Radiation tolerance), (*Brain, Radiation effects), Whole body irradiation, Central nervous system, Metabolism, Proteins, Sodium, Nutrition, Shock (Pathology), Electrolytes (Physiology), Body weight, Blood plasma, Water, Testes, Thymus, Dose rate , X rays, Electric currents, Rats, Chlorides.

Evidence was presented that 250 - 500 r whole-body X-irradiation can produce significant alterations in brain function as measured by changes in electroshock seizure thresholds and patterns and in spontaneous electrical activity recorded from chronically implanted electrodes in hippocampus, midbrain reticular formation, and prepyriform cortex. The results were interpreted to indicate that X-irradiation produces a state of brain hyperexcitability and impairs the ability of the nervous system to sustain seizure activity. These post-irradiation changes in brain function were accompanied by general metabolic effects and alterations in plasma and brain water and electrolyte patterns. Body weight, testes and thymus weight were reduced after 500 r whole-body X-irradiation. Irradiation reduced sodium and chloride in plasma while it increased sodium content of cortex and cerebellum; thus the results suggested that irradiation effects on the central nervous system might be correlated with electrolyte alteration in selected brain areas. A diet high in protein given before and after 500 r whole-body X-irradiation was found to have a radioprotective action on the post-irradiation changes in electroshock convulsive responses and in metabolism. There were also indications of protective actions with a low sodium diet. (Author)

17. Metallurgy

Patent 3,167,426 Div. 17

NICKEL-BASE ALLOY.
Patent assigned to NASA,
by John C. Freche, Thomas J. Riley, and William J. Waters. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nickel alloys), (*Nickel alloys), Molybdenum alloys, Tungsten alloys, Aluminum alloys, Chromium alloys, Vanadium alloys, Carbon alloys, Tantalum alloys, Heat-resistant metals and alloys, Mechanical properties, Aerospace craft, Rocket motors (Liquid propellant), Jet planes, Zirconium alloys.

The alloy is useful in forming components of turbo-jet aircraft rocket-powered missiles and aerospace vehicles. The alloy contains 60 to 76 percent nickel, from 6 to 10 percent of molybdenum-tungsten, 4 to 8 percent aluminum, 4 to 8 percent chromium, 0.5 to 3 percent zirconium, 1 to 7 percent vanadium, 0.05 to 1.0 percent carbon, and 3 to 12 percent tantalum.

18. Military Sciences and Operations

No Entries

19. Navigation

Patent 3,165,927 Div. 19

VERTICAL INDICATING AND NAVIGATION SYSTEM.
Patent assigned to Navy,
by William H. Heath, Yves Nubar, George Arshal, John R. White, and Stewart Reiner. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Navigational aids), (*Navigational aids, Patents), (*Vertical indicators, Navigational aids), Inertial navigation, Ground speed, Stabilized platforms, Accelerometers, Gyroscopes, Position finding.

The navigation system utilizes inertial information and ground velocity information as inputs. These inputs are converted into torques of appropriate character that are applied to a platform in an appropriate manner so as to null its pitch and roll angles continuously with respect to the horizontal plane. Inertial information that consists in accelerations and rates of rotation is measured by accelerometers and gyros that are installed on the platform, while the ground velocity is measured and is transferred to the platform and resolved along its axes. In an aircraft the ground velocity can be obtained by means of doppler-radar, optical, or other means of instrumentation.

Patent 3,166 974 Div. 19, 24

OPTICAL DISPLAY APPARATUS.
Patent assigned to Navy,
by Alphonse C. Cote and Daniel F. Stanfill, III. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Optical equipment), (*Optical equipment, Patents), (*Navigation, Display systems), Viewing screens, Lenses, Optical filters, Reticles.

The optical display apparatus projects illuminated symbols on a navigational display screen. It is adapted for airborne use in anti-submarine warfare and a similar tactical navigation missions. The display apparatus is basically comprised of three optical systems including three projectors.

Patent 3,167,648 Div. 19

NAVIGATION COMPUTER FOR REPRESENTING THE VERTICAL DIRECTION.
Patent assigned to Navy,
by William H. Heath, Yves Nubar, George Arshal, Stewart Reiner, and David C. Hughes. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Navigation computers), (*Navigation computers, Patents), (*Vertical indicators, Navigation computers), Inertial navigation, Velocity, Accelerometers, Gyro stabilizers.

The device continuously determines the true vertical of a moving vehicle such as an aircraft so that an accurate reading of stars can be obtained. The navigation system utilizes inertial information and ground velocity information as inputs. These inputs are converted into torques of appropriate character that are applied to a platform in an appropriate manner so as to null its pitch and roll angles continuously with respect to the horizontal plane. Inertial information that consists in accelerations and rates of rotation is measured by accelerometers and gyros that are installed on the platform, while the ground velocity is measured and is transferred to the platform and resolved along its axes.

20. Nuclear Physics and Nuclear Chemistry

CAPE-1150 Div. 20

Oak Ridge National Lab., Tenn.
CALCINER POT, 8 IN.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Containers, Radioactive waste), (*Radioactive waste, Containers), Mechanical drawings.

This mock-up pot is used in liquid waste calcination. It is designed for a maximum pressure of 200 psi at 600F; a maximum temperature of 1700F at 10 psi for 100 hr; negligible reduction of wall thickness due to corrosion during calcination; and negligible shell stresses due to contraction. Further investigation is recommended to verify design assumptions, as 304 L stainless steel is used and creep rupture data for this material were not readily available. The pot is 62.5 in. long and 8 in. ID. The reducer has an 8 in. ID at the bottom, a 4 in. ID at the top, and is 6 in. long. (AEC Abstract)

CAPE-1168 Div. 20, 16

Oak Ridge Gaseous Diffusion Plant, Tenn.
ZONAL CENTRIFUGE, A-XII.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Centrifuges, Design), (*Centrifuge separation, Cells, (Biology)), Mechanical drawings.

This package contains 3 drawings. For a listing of individual titles see the Engineering Materials List (TID-4100). A low-speed zonal centrifuge was developed. This A-XII centrifuge is an improved version of the A-IX Centrifuge. It is used to separate cells, subcellular particles, and other microscopic materials. The rotor volume of 1300 ml is divided into four equal sectors. Each sector is 9/16 in. deep with a maximum radius of 7 in. and a minimum radius of 1.86 in. Rotor end caps are constructed of transparent lucite to permit visual observation. The maximum design speed of the rotor is 6,000 rpm. The A-XII core is a 45 cone section with a 3.72 in. OD and a 1.5 in. ID. It can be replaced by other cores to make the rotor suitable for a low volume application or for isopycnic banding. (AEC abstract)

CAPE-1190 Div. 20-

Chicago Operations Office, Atomic Energy Commission, Ill.
LA CROSSE BOILING WATER REACTOR TANKS.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Boiling water reactors, Tanks (Containers)), (*Tanks (Containers), Specifications), Mechanical drawings.

Descriptions and specifications are given of the 15 tanks used with the La Crosse Boiling Water Reactor. Fifteen drawings are included. (AEC Abstract)

Patent 3,164,462 Div. 20, 4, 17

PREPARATION OF THORIUM METAL FROM THE OXIDE.
Patent assigned to AEC,
by James Knighton, Alleppey V. Hariharan, Robert K. Steunenberg, and Wesley H. Hauschildt. 5 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Thorium), (*Thorium, Patents), Preparation, Thorium compounds, Dioxides, Reduction (Chemistry), Magnesium compounds, Chlorides, Fluorides, Magnesium alloys, Zinc alloys, Thorium alloys.

Thorium dioxide is reduced to thorium metal by dispersing it in a molten flux of magnesium chloride and magnesium fluoride in an inert atmosphere at between 825 and 875 degrees C. An excess of a magnesium-zinc alloy is then added to the solution formed whereby thorium dioxide is reduced to the metal. This is dissolved in the excess alloy to form a final alloy. The alloy contains about 12 percent by weight of thorium.

Patent 3,165,376 Div. 20, 4

PROCESS FOR SEPARATION AND RECOVERY OF VOLATILE FLUORIDE IMPURITIES FROM URANIUM HEXAFLUORIDE CONTAINING THE SAME.
Patent assigned to AEC,
by Waldo R. Golliher. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Patents), (*Uranium compounds, Purification), Separation, Chemisorption, Technetuim compounds, Neptinium compounds, Vanadium compounds, Molybdenum compounds, Magnesium compounds, Fluorides, Recovery, Processing.

Volatile fluorides of metals in the group comprising technetium, neptunium, vanadium and molybdenum are separated from UF6 containing the same by contacting the UF6 with magnesium fluoride whereby the volatile fluoride contaminants are selectively sorbed by the MgF2. This process is particularly useful for removing and recovering technesium fluoride. The sorbed technetium and neptunium values are readily desorbed and obtained in high purity form by further processing.

Patent 3,165,377 Div. 20, 4

SEPARATION OF STAINLESS STEEL FROM A NUCLEAR FUEL.
Patent assigned to AEC,
by Herbert M. Katz. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel cladding), (*Reactor fuel cladding, Patents), (*Stainless steel, Reactor fuel cladding), Sulfuric acid, Separation, Reactor fuel elements, Nitric acid, Sulfamic acids.

Stainless steel cladding is separated from the core of a nuclear fuel element by the process which is an improve-

ment over the 'Sulfex Process' which involves the use of sulfuric acid to dissolve the stainless steel cladding. An improvement in the 'Sulfex Process' results if it is carried out in a stainless steel container which is equipped with a downdraft condenser. Nitric and sulfamic acids are also used.

Patent 3,165,835 Div. 20

APPARATUS FOR CHECKING THE ALIGNMENT OF VERTICAL CHANNELS,
Patent assigned to AEC,
by Richard D. Duncan. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor system components), (*Reactor system components, Patents), Reactor inspection, Control rods, Reactor moderators, Reactor cores, Test equipment, Alignment.

The apparatus is for checking the misalignment or distortion of safety or control rod channels in a nuclear reactor. The target device is suspended by cables from a double reel mounted over a vertical reactor channel of rectangular shape to be observed. A transit is positioned near the mounting device. The target device is used as an indicating device for ascertaining channel distortion.

Patent 3,167,482 Div. 20, 7

FUEL ELEMENT.
Patent assigned to AEC,
by Kurt Katz. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel elements), (*Reactor fuel elements, Patents), (*Thermoelectricity, Reactor fuel elements), Energy conversion, Semiconductors, Uranium compounds, Oxides, Metal plates, Mica, Fission, Heat.

The fuel element is composed of a plurality of thermoelectric junctions formed of semiconductor fissionable materials having Seebeck coefficients of opposite sign. Uranium oxides having slightly different oxygen content are used as the semiconductor materials. The uranium oxides constitute the fissionable fuel for the reactor as well as the hot junction thermomaterial.

Patent 3,167,654 Div. 20, 8

DOUBLE PULSE RECOGNITION CIRCUIT.
Patent assigned to AEC,
by Larry Scott. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radiation measurement systems), (*Radiation measurement systems, Patents), (*Pulse discriminators, Radiation measurement systems), Charged particles, Coincidence counting.

The circuit prevents signals from a charged particle sensitive apparatus from being received by an associated particle registering device when successive charged particles enter the apparatus within a time interval less than that required for the device to distinguish between the particles. A pair of particle detectors are disposed in a telescope arrangement so that charged particles must pass through two preliminary detectors prior to reaching the principal detection apparatus. The data from such pair of detectors are used for determining if information from the principal detection apparatus is valid, that is, whether information from such apparatus is from a single particle or is invalid information from more than one particle.

Patent 3,167,655 Div. 20

TARGET FOR A NEUTRON GENERATOR CONSISTING OF A COATING OF ONE OF THE LANTHANON ELEMENTS ON A BASE METAL.
Patent assigned to AEC,
by Reuben Redstone and Charles Rowland. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Particle accelerator targets), (*Particle accelerator targets, Patents), (*Neutrons, Particle accelerator targets), Ion beams, Deuterium, Tritium, Metal films, Yttrium, Rare earth compounds, Molybdenum, Tungsten.

The target is for a neutron generator of the type in which a beam of energetic ions of hydrogen isotope bombards a target composed of metal impregnated with hydrogen isotope. The thin metal film from the group of yttrium and lanthanons is supported on a substrate of molybdenum or tungsten.

Patent 3,169,117 Div. 20

NUCLEAR REACTOR FUEL PASTE COMPOSITION.
Patent assigned to AEC,
by Robert W. Dickinson and Donald T. Eggen. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuels), (*Reactor fuels, Patents), Colloids, Sodium, Uranium compounds, Plutonium compounds, Thorium compounds, Reactor fuel elements, Particles, Carbides.

The nuclear reactor fuel is in paste form. It consists of a sodium carrier and at least one fissionable fuel in solid particle form, such as UC, PuC and ThC. The fuel is used in power reactors.

Patent 3,169,187 Div. 20

LOW ENERGY BETA RADIATION SYSTEM FOR FLUENT MATERIALS WITH PLURAL SCINTILLATION FIBERS IN HEXAGONAL ARRAY.
Patent assigned to AEC,
by Clinton A. Stone, Leonard Reiffel, and Italo Filosofo. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radiation measurement systems), (*Radiation measurement systems, Patents), (*Radioactivity, Fluids), Scintillation counters, Photomultipliers, Beta particles.

The radiation counter is for measuring the radioactivity of a liquid or gas sample. The device is in the form of a cylindrical container having a plurality of scintillating fibers longitudinally disposed therein. The sample is injected into the container through entrance and exist ports provided therein and passes between the interstices of the fibers along the length thereof. Scintillations are caused in the fibers responsive to the radioactivity of the sample and the light therefrom is transmitted along the fibers to a photomultiplier located at the ends thereof.

Patent 3,169,188 Div. 20

CASE FOR PHOSPHOR GLASS DOSIMETER.
Patent assigned to Navy,
by Charles R. Horner and William F. Gray.
9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors (*Patents, Dosimeters), (*Dosimeters, Patents), Phosphorescent materials, Glass, Containers, Shielding, Gamma rays, X-rays.

The dosimeter utilizes a phosphor glass which stores up energy proportional to the amount of radiation received. It includes a phosphor glass shielded and mounted within a suitable carrying case in such a way as to be capable of receiving and storing energy proportional to the amount of photon radiation falling upon it.

21. Nuclear Propulsion

No Entries

22. Ordnance

Patent 3,165,753 Div. 22, 4

PREPARATION OF 1-ALKYL-3,5-DINITRO-1,2,4-TRIAZOLE.
Patent assigned to Navy,
by Newton R. Smith and Richard H. Wiley. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive materials), (*Explosive materials, Patents), (*N-heterocyclic compounds, Synthesis (Chemistry)), Organic nitrogen compounds, Preparation, Sulfites, Safety, Charges (Explosive).

The 1-alkyl-3,5-dinitro-1,2,4-triazoles are prepared by alkylation of 3,5-dinitro-1,2,4-triazole in ether. 3,5-dinitro-1,2,4-triazole is prepared by the diazotization of guanazine, followed by recovery with ether extraction. The process eliminates formation and handling of the highly explosive intermediate silver salt of 3,5-dinitro-1,2,4-triazole, a hazardous step of the prior process for preparing 1-alkyl-3,5-dinitro-1,2,4-triazoles. 1-methyl-3,5-dinitro-1,2,4-triazole, a high-explosive, is specifically claimed.

Patent 3,166,015 Div. 22

RADIO FREQUENCY PROXIMITY FUZE.
Patent assigned to Navy,
by Merle A. Tuve and Richard B. Roberts. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radio proximity fuzes), (*Radio proximity fuzes, Patents), Antiaircraft ammunition, Projectiles.

The radio-operated proximity fuse is used in anti-aircraft projectiles. The fuse has an oscillator circuit coupled to an antenna, an amplifier, which may have detector action, connected to a suitable point in the oscillator circuit, and a thyratron connected to the output of the amplifier so that it is triggered by a change of predetermined magnitude in the radiation resistance of the antenna due to the proximity of a reflecting surface, such as an aircraft. A detonating squib electrically connected to the thyratron is operated when the thyratron is triggered.

Patent 3,166,864 Div. 22

OBTURATOR FOR SMALL ARMS.
Patent assigned to Army,
by John J. Scanlon, Jr. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Obturation (Ballistics)), (*Obturation (Ballistics), Patents), (*Small arms, Obturation), O-rings, Bolts, Pins (Mechanical).

The obturator is for a rifle such as the .30 caliber or 7.62 millimeter size. It is capable of sealing both the bolt and firing pin against gas leakage past them when an entirely consumable round is used. O-rings are utilized with expansion rings to form a seal.

Patent 3,166,982 Div. 22

LOADER MECHANISM.
Patent assigned to Navy,
by Arthur J. Stanton, David F. Anderson, and Richard E. Taylor. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Loaders), (*Loaders, Patents), Antiaircraft guns, Shipborne, Naval guns, Rocket assisted projectiles, Launching, Mechanical drawings.

The loader mechanism is used in a projectile launching system for shipboard antiaircraft use. The gravity feed loading mechanism loads rounds into an ammunition magazine. The system enables machine gun rates of fire of case-enclosed, rocket-propelled type missile.

Patent 3,167,047 Div. 22

CONTROL CABLE CUTTER.
Patent assigned to Navy,
by Henry D. Eng. 26 Jan 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Cutting tools), (*Cutting tools, Patents), (*Torpedoes, Electric cables), (*Electric cables, Torpedoes), Underwater cutting, Control.

The cutter is for severing the control cable of a torpedo. The disc-like free floating cutting blade has a sharpened sector portion through which the cable to be severed passes. The blade is attached by means of fingers to a barrel. Gears and a gear rack are associated with a piston mounted in a piston. The piston is controlled by a solenoid which is activated by a signal.

Patent 3,168,832 Div. 22

ESCAPEMENT MECHANISM.
Patent assigned to Army,
by John F. Fazio. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Timing devices), (*Timing devices, Patents), Clock delay mechanisms, Springs, Control systems.

The escapement mechanism constitutes a part of the clockwork movement employed in mechanical time fuses. The arrangement is such that the fixed end of the escapement spring may be adjusted laterally until optimum operating conditions are realized.

Patent 3,168,833 Div. 22

TIMING ESCAPEMENT MECHANISM.
Patent assigned to Army,
by Dragolyoub Popovitch. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Timing devices), (*Timing devices, Patents), Clock delay mechanisms, Control systems.

The mechanical timer or clock provides control functions according to elapsed time while a high-speed aircraft, missile, or artillery shell, travels between two points in its flight or trajectory. The escapement assembly is of the type having a rotary escapement wheel and a pivoted escapement lever with oscillating masses and two bladed escapement pallets, arranged in balanced relation about the pivot axis of an operating arbor, in a generally conventional manner, to control the step-by-step rotary movement of the escapement wheel. The latter is connected through a gear train with the controlled mechanism and the driving spring or other energy source for the escapement mechanism and timer.

Patent 3,169,084 Div. 22, 7

DEFERRED ACTION BATTERY.
Patent assigned to Navy,
by George M. L. Sommerman, Dale C. Gerber, and Roy D. Livingston. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Batteries and components), (*Batteries and components, Patents), (*Primary cells, Electric detonators), Storage batteries, Electrolytes, Projectiles, Shock resistance.

The battery is used in electrically detonated projectiles which are fired from a rifle. The electrolyte is contained in an ampoule. Force of setback upon firing forces the ampoule downwardly against a striker. The ampoule is shattered and the electrolyte is released. An arrangement is provided for taking off excess electrolyte.

PB-166 783 Div. 22, 4, 30
CFSTI Prices: HC$3.00 MF$0.75

Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N. J.
EXPLOSIVES RESEARCH SECTION. SAFETY HANDBOOK.
Dec 59, 60p Unclassified report
AD 233 149

Descriptors: (*Explosive materials, Safety), (*Safety, Handbooks), (*Ordnance laboratories, Safety), Chemicals, Handling, Fire extinguishers, Igniters, Explosives initiators, Pyrotechnics, Storage, Disposal, Bibliographies.

The Handbook is divided into five parts. Part I includes general rules for laboratory safety and, in general, contains information about the safe handling of ordinary laboratory chemicals and equipment. Part II contains information of particular interest to the explosives chemist including material on evaluation of new explosives and explosive materials and various types of experimental compositions. Part III contains a list of compounds, mixtures, and reactions which are, or may be, hazardous. Usually included, too, are references to the literature in which additional information may be obtained. Part IV contains information on the storage and disposal of laboratory explosives which are no longer needed. Part V contains a list of books and pamphlets on laboratory safety and explosives chemistry. (Author)

23. Personnel and Training

PB-166 829 Div. 23, 30
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE PROGRAMMER IN A CHANGING WORLD,
by Willis H. Ware. Sep 63, 5p Rept. no. P-2793
AD 418 739
Unclassified report

Prepared for publication in Electronic News.

Descriptors: (*Programmers, Job analysis), Computers, Programming (Computers), Programming languages, Operation, Theory, Training, Education, Scientific research.

24. Photography and Other Reproduction Processes

Patent 3,167,265 Div. 24

FILM REEL DRIVE.
Patent assigned to Army,
by Seymour L. Thau. 26 Jan 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Drives), (*Drives, Patents), (*Reels, Drives), (*Photographic film, Reels), Variable-speed drives, Control systems, Speed regulators, Photographic film, Winding.

The drive is for transferring film from one reel to another at a constant speed and under constant tension. The winding and unwinding reels of the film transport system are simultaneously driven by use of friction wheels against the flanges of the reels. Sensing arms, in contact with the film on each of the reels, control the positions of the respective friction wheels to correspond to the diameter of the film on the reel and to vary as that diameter varies.

Patent 3,167,429 Div. 24

MONOBATHS CONTAINING SODIUM POLYACRYLATE AND POLYVINYL-PYRROLIDONE.
Patent assigned to Army,
by Marilyn Levy. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Photographic chemicals), (*Photographic chemicals, Patents), (*Photographic film, Processing), Halides, Silver compounds, O-Heterocyclic compounds, Acrylic resins, Pyrroles.

The one-step processing bath for exposed silver halide photosensitive materials includes developing elements such as 1-phenyl-3-pyrazolidone and fixing agents in proportion to provide simultaneous complete developing and fixing of the image and 400 to 1000 cc. of 12.5 percent solution sodium polyacrylate and 3 to 15 grams of polyvinyl-pyrrolidone per liter of solution.

25. Physics

PB-166 779 Div. 25
CFSTI Prices: HC$3.00 MF$0.75

Naval Research Lab., Washington, D. C.
STARK BROADENING OF ISOLATED SPECTRAL LINES IN A PLASMA.
Final rept.,
by H. R. Griem. 16 Jun 64, 73p Rept. no. NRL-6084
Grants NSF GP1376, NASA R9, Proj. RR002 10 45 5054
N64 28874; AD 433 762
Unclassified report

Descriptors: (*Plasma medium, Line spectrum), (*Line spectrum, Atomic energy levels), (*Spectra (Visible and ultraviolet)), Tables, Electric fields, Light, Thermionic emission, Scattering, Measurement, Excitation, Helium, Perturbation theory, Ions, Cesium, Quantum mechanics, Charged particles, Frequency shift.

Stark broadening parameters for spectral lines from neutral and singly ionized atoms broadened and shifted by the local fields of both electrons and ions in a plasma are calculated in the classical path approximation. The electron collisions are treated by an impact theory allowing for deviations from adiabaticity and the ion effects by the quasi-static approximation in which electron shielding and ion-ion correlations are taken into account. An accuracy of about 20 percent in the resulting line profiles is expected, except for the position of the intensity maxima of lines with relatively small shifts and for ion lines from highly excited levels. Stark broadening parameters for many of the stronger multiplets of first and second spectra of light and medium elements are tabulated. The multiplets are arranged in the same way as in the multiplet tables for visible and ultraviolet lines. Within the accuracy of the present calculations, the same Stark broadening parameters can be used for all lines of one multiplet. In practice, however, different lines from a given multiplet may overlap each other. In this case it is then necessary to construct their combined profile by superposition of the individual profiles according to relative intensities and unperturbed wavelengths. (Author)

PB-166 850 Div. 25, 8, 20
CFSTI Prices: HC$2.00 MF$0.50

Microwave Lab., Stanford Univ., Calif.
A REVIEW OF CYCLOTRON HARMONIC PHENOMENA IN PLASMAS.
Technical rept.,
by F. W. Crawford. Aug 64, 49p Rept. no. ML-1215
Grant NSF GP936
Unclassified report

Descriptors: (*Reviews, Cyclotron waves), (*Cyclotron waves, Plasma physics), (*Plasma physics, Cyclotron resonance phenomena), Propagation, Electron beams, Wave transmission, Thermonuclear reactions.

The objects of this review are to interpret and to explain the substantial volume of experimental data accumulated on cyclotron harmonic phenomena. This can be done in terms of cyclotron harmonic waves, the propagation of which has been predicted for warm plasmas in a magnetic field. The review gives a brief outline of the theory involved, and concentrates on the basic physical mechanisms of the effects observed experimentally. These phenomena are of considerable practical importance in the understanding of processes occurring in fusion study devices, other laboratory discharges, and the ionosphere, and there are several potential applications to plasma diagnostics. The paper concludes with a brief discussion of these.

26. Production and Management

CAPE-1141 Div. 26

Oak Ridge National Lab., Tenn.
REMOTE WELDING DEVICE.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Welding, Remote control systems), Operation, Design.

This remotely operated, heliarc welder is used in seal welding of capsules located in hot cells. It is enclosed in a plexiglas cage that contains the required inert atmosphere. The torch is remotely positioned vertically or horizontally. The capsule revolves on a water-cooled turntable that is operated by a Selzen motor system. (AEC Abstract)

CAPE-1155 Div. 26

Lawrence Radiation Lab., Univ. of California, Livermore.
ELECTRON BEAM WELDER.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Electron beams, Welding), (*Welding, Electron beams), Mechanical drawings.

The electron beam welder is constructed of No. 303 non-magnetic stainless steel. It comprises an anode, cathode, gun body, and insulator. It produces clean, tight welds and is used in soldering. Copper has exhibited a detrimental effect on this type of oxide gun.

CAPE-1170 Div. 26, 20

Dow Chemical Co., Denver, Colo.
PLUTONIUM SHIPPING CONTAINERS.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Plutonium, Containers), (*Containers, Plutonium), Mechanical drawings, Transportation, Safety.

These shipping containers are used to transport plutonium for power reactors and to eliminate discrepancies found in shipping and in receiving. The L-10 Pu(NO3)4 container consists of a 55-gal drum, which contains a stainless steel pressure chamber of 5.563-in. OD, 4.813-in. ID, and a height of 53 in. A polyethylene bottle of 4.665-in. ID and a height of 51 in. is used. The L-3 Pu(NO3)4 container consists of a 55-gal drum which encloses a stainless steel pressure chamber of 5.563-in. OD, 4.813-in. ID, and a height of 18.5 in. The polyethylene bottle is 4.740-in. ID and 16.8 in. in height. (AEC Abstract)

Patent 3,164,897 Div. 26

METHOD OF BRAZING.
Patent assigned to AEC,
by Peter Patriarca and Gerald M. Slaughter. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Brazing), (*Brazing, Patents), Heat exchangers, Corrosion-resistant alloys, Liquid metal cooked reactors, Reactor system components, Nickel, Phosphorus, Chromium.

The method is useful in joining fin-to-tube heat exchangers. The metal surfaces are joined by preplacing a brazing composition comprised of a major portion of nickel, a minor portion of phosphorus and a minor portion of chromium on the surfaces, and brazing together the resulting surfaces.

Patent 3,165,061 Div. 26, 9, 25

METHOD AND APPARATUS EMPLOYING ACOUSTIC ENERGY FOR INCREASING FLUID FLOW.
Patent assigned to Navy,
by Edward H. Smith and David E. Stone. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pumps), (*Pumps, Patents), (*Fluid flow, Acoustics), Pulse generators, Pipes.

Acoustic wave energy in a stream of liquid is utilized to increase the efficiency of a single-acting pump or of a reciprocating double-acting pump. Acoustic waves are utilized and these may be induced in a stream by a plane piston which reciprocates in a pipe.

Patent 3,166,797 Div. 26

FIBER BALE OPENER AND BLENDER.
Patent assigned to Agriculture,
by Mayer Mayer, Jr. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Packaging), (*Packaging, Patents), (*Fibers, Packaging), Textiles, Conveyors.

The apparatus is for opening and blending textile fibers from single or from composite bales. A bale is supported on an endless conveyor in a housing open at one end. Two endless belts are provided with spikes which pluck tufts of fiber from the bale and carry them forward to the pivotally mounted ends of the belts. The tufts are removed from the spikes by suitable doffers.

Patent 3,166,949 Div. 26, 11

HARMONIC DRIVE ADJUSTING MEANS.
Patent assigned to Navy,
by Roger H. Lapp. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Drives), (*Drives, Patents), Ball bearings, Gears, Tolerances (Mechanics).

An expansible, elliptical disk, in which the major axis may be minutely varied, is provided for spreading the flexible ball bearing arrangement of a conventional harmonic drive unit. The spreading of the ball bearings maintains the various parts of the unit in a tight relationship and minimizes looseness therebetween. As the major axis of the disk is increased the flexible gear applies a compressive force in the region of the minor axis of the disk. Flexible fingers on the disk act to absorb the stresses exerted thereon by the flexible gear.

Patent 3,166,952 Div. 26

DRIVE SYSTEMS.
Patent assigned to Navy,
by Richard E. Lang. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Drives), (*Drives, Patents), Gears, Hydraulic equipment, Electrical equipment, Torque.

The drive system employs gearing which eliminates back-lash. The arrangement is applicable in principle to either an electric or a hydraulic drive. A novel opposing torque motor arrangement provides a backlash free gear train.

Patent 3,167,346 Div. 26

QUICK ACTING HOOK.
Patent assigned to Navy,
by Marvin O. Miller. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hooks), (*Hooks, Patents), (*Sea rescue equipment, Hooks), Recovery, Launching, Automatic.

The manually maneuvered, normally open hook automatically closes upon contact with an object to be held and is adapted to be manually released and controlled by a lanyard when the load is removed. The use of such a hook is particularly applicable to boat recovery systems especially when launching or recovery is made in open water where waves and currents affect such work. The vertically suspended hook body has a horizontal hook opening and a foam rubber grip attached to the body so that the suspended hook opening can be maneuvered with greater facility and safety into engagement with a load bar.

27. Propulsion Systems

CAPE-1143 Div. 27

Oak Ridge National Lab., Tenn.
TURBINE SPEED MEASURING SYSTEM/Q-2124.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Turbines, Velocity), (*Turbopumps, Measuring devices (Electrical and Electronic)), Mechanical drawings.

This package contains 2 drawings. For a listing of individual titles see the Engineering Materials List (TID-4100). This speed measuring system is used to measure the velocity of a high-temperature turbopump. It consists of a pick-up assembly, hi-pass filter, 10-w audio amplifier, 2 alarms for underspeed, an alarm for overspeed, an overspeed scram switch, an external meter, and a Brown recorder. The pick-up consists of 2 magnets, 2 pole pieces, 2 heat dissipators, and assorted hardware. Accurate speed measurements are possible in the range of 0 to 24,000 rpm. (AEC abstract)

Patent 3,165,888 Div. 27

EXHAUST NOZZLE FOR REACTION ENGINES AND THE LIKE.
Patent assigned to Navy,
by Edward F. Keon. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Rocket motor nozzles), (*Rocket motor nozzles, Patents), (*Pyrolytic graphite, Rocket motor nozzles), Thermal insulation, Thermal properties.

The exhaust nozzle is for a reaction motor used in a vehicle. The inner surface of the heat-controlling and insulating exhaust nozzle is made of pyrolytically-formed graphite, with the thermal anistrophy of the graphite providing the desired thermal characteristics.

Patent 3,166,896 Div. 27, 10

METHOD FOR SUPPRESSING ROCKET MOTOR EXHAUST FLAME.
Patent assigned to Navy,
by Richard A. Breitengross, Jr. and William E. Donaldson. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flame arresters), (*Flame arresters, Patents), (*Rocket motors (Solid propellant), Flame arresters), Rocket propellant grains, Disks, Potassium compounds, Sulfates, Perchlorates, Nitrocellulose, Hydrocarbons.

The jet-actuated device includes, in combination, a rocket motor having at least one exit nozzle, a propellant grain within the motor and a flame-suppressing disk bonded to the nozzle end of the grain. The disk consists essentially of potassium sulfate, potassium perchlorate, nitrocellulose, pentaerythritol trinitrate and meta-dihydroxy-benzene.

28. Psychology and Human Engineering

No Entries

29. Quartermaster Equipment and Supplies

Patent 3,164,148 Div. 29

INSULATED CONTAINER.
Patent assigned to Army,
by Joseph Tolciss. 5 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Containers), (*Containers, Patents), Food, Thermal insulation, Polar regions, Arctic regions, Storage, Kitchen equipment and supplies, Packing materials.

The insulated container is for keeping food warm in the Artic or Antarctic. The container contains a body of fusible heat storing and diffusing material disposed around the top of the container wall to offset any loss of heat through an upper double wall area which may be depleted of insulation by the packing.

Patent 3,167,202 Div. 29

CLOSURE ASSEMBLY FOR CONTAINER NECK.
Patent assigned to Army,
by Joseph Tolciss. 26 Jan 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Seals (Stoppers)), (*Seals (Stoppers), Patents), Kitchen equipment and supplies, Thermal insulation, Protective coverings.

The closure assembly is for insulated containers of the type adapted to keep coffee hot. A combination guard and neck is provided which has interfitting elements resisting separation. The closure and guard include interengaging elements for resisting separation of the closure and guard.

Patent 3,167,437 Div. 29

PROCESS FOR PREPARING STERILIZED CONCENTRATED MILK PRODUCTS.
Patent assigned to Agriculture,
by Abraham Leviton and Michael J. Pallansch. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Milk), (*Milk, Patents), Preparation, Preservation, Salts, Zinc compounds, Iron compounds, Sulfates.

The high temperature-short time sterilized concentrated milk product has improved storage stability. The milk has incorporated in it from 0.003 to 0.015 mole per kilogram of milk solids-not-fat of a water soluble, non-toxic, divalent salt of a metal selected from the group consisting of zinc and iron, such as zinc sulfate or ferrous sulfate.

Patent 3,169,068 Div. 29

PRESERVATIVE OF OXYGEN-LABILE SUBSTANCES, E. G., FOODS.
Patent assigned to Agriculture,
by Felix Bloch. 9 Feb 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Antioxidants), (*Antioxidants, Patents), (*Dehydrated foods, Preservation), Oxygen, Carbon, Sodium compounds, Sulfites, Bicarbonates, Water.

The oxygen scavengers are used with dehydrated eggs, dehydrated whole milk, dehydrated potatoes, edible fats and oils, nuts and the like. A scavenger composition contains activated carbon, sodium metasulphite, sodium bicarbonate and water.

Patent 3,169,069 Div. 29

PREPARATION OF PRE-COOKED FROZEN POULTRY PRODUCTS.
Patent assigned to Agriculture,
by Helen L. Hanson and Lorraine R. Fletcher.
9 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Frozen foods), (*Frozen foods, Patents), Chickens, Preparation.

Raw chicken parts are roasted, dredged with a farinaceous material and fried in a hot fat to develop a gold-brown coloration. The fried product is then cooled and put in cold storage.

PB-166 825 Div. 29
CFSTI Prices: HC$3.00 MF$0.75

Denison Research Foundation, Powell, Ohio.
COMPRESSION OF DEHYDRATED FOOD PRODUCTS.
Rept. no. 5 (final), 6 Sep 61-29 Sep 62,
by M. M. Hamdy. 29 Sep 62, 61p
Contract DA19 129qm1898, Proj. 7 84 06 031
DSSC V-339; AD 409 794
Unclassified report

Descriptors: (*Dehydrated foods, Compressive properties), (*Vegetables, Compressive properties), Beef, Fruits, Freeze drying, Analysis, Machines, Design, Specifications.

Nine dehydrated foods, including two freeze-dried products, were compressed, and evaluated organoleptically and objectively. A pilot-scale machine was designed and a production formula was developed. (Author)

PB-166 827 Div. 29, 32
CFSTI Prices: HC$2.00 MF$0.50

Chicago Univ., Ill.
INVESTIGATION OF PLANT WATER RELATIONS OF SELECTED FOOD CROPS AS AFFECTED BY VARIOUS PHYSIOLOGICAL CONDITIONS.
Rept. no. 7 (final), 1 Sep 60-28 Feb 62,
by Wayne J. McIlrath. 28Feb 62, 32p
Contract DA19 129qm1608, Proj. 7 84 06 031A
DSSC V-334; AD 283 050
Unclassified report

Descriptors: (*Vegetables, Moisture), (*Plants (Botany), Aging (Physiology)), Absorption, Freeze drying, Soils, Light, Stress (Physiology), Bleaching agents, Fats.

It was observed that the physiological age of bean fruits appeared to influence their capacity to rehydrate. Different relationships between age and rehydration appeared to exist depending upon the method of dehydration used. Dried material rehydrated for 15 minutes at 100C, exhibited a higher rehydration ratio than that rehydrated for 24 hours at 80C, or below. The type and frequency of cutting of the bean fruits prior to dehydration influenced the rehydration ratios of material rehydrated for 15 minutes in boiling water; the smaller the fruit segment, the greater was the rehydration ratio. These differences in rehydration ratios disappeared, however, upon subjecting the material to prolonged boiling. The rehydration ratio of the fruit coat was found to be approximately four times greater than that of the seeds. Thus the fruit coat contributes significantly to the rehydration of the bean fruit. Extraction of fatty constituents from dried bean fruits had no measurable influence on the rehydration ratio of the material. It was observed that blanching of bean fruits prior to drying resulted in a significant increase in the rehydration ratio of the dried product. The ratio of water-blanched beans was higher than that of material that was steam-blanched. (Author)

30. Research and Research Equipment

CAPE-1144 Div. 30, 17

Oak Ridge National Lab., Tenn.
DELTA P MANOMETER LEVEL ELEMENT/Q-2122.
Engineering Materials. Unclassified drawing

Price information available from CFSTI upon request.

Descriptors: (*Liquid metals, Manometers), (*Liquid level gages, Tanks (Containers), Mechanical drawings, Potassium, High temperature research.

This package contains 1 drawing. For a listing of individual titles see the Engineering Materials List (TID-4100). This instrument is used to continuously measure the level of potassium in an expansion tank or catch tank at temperatures up to 1500F. It also may be used to measure the level of any liquid metal. (AEC abstract)

Patent 3,163,935 Div. 30, 6, 8, 12, 19

MECHANICAL COORDINATE CONVERTER.
Patent assigned to NASA,
by Richard M. Beckwith. 5 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Instrumentation), (*Instrumentation, Patents), (*Tracking, Instrumentation), Antennas, Satellite antennas, Spacecraft, Navigational aids, Digital systems, Radar antennas, Radio signals, Simulators, Training aids, Gimbals, Design.

The converter is useful in conjunction with tracking antennas for spacecraft or satellites which may be oriented in either the azimuth-elevation coordinate system or hour angle declination coordinate system to facilitate ready conversion from one system to the other. It supplements electronic digital converters. The structure includes a base, a standard, three gimbals which are interassociated and several scales.

Patent 3,164,019 Div. 30, 9

MASS FLOW MEASURING DEVICE.
Patent assigned to AEC,
by Glenn M. Burgwald, Leonard Reiffel, William K. Genthe, and Clayton Fyfe. 5 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flowmeters), (*Flowmeters, Patents), Fluid flow, Measurement, Density, Transport properties.

A mass flow measuring device is disclosed wherein measurements are accomplished external to the flow of the measured fluid. An S-shaped insert is flexibly coupled into the pipe where the fluid flows. Instruments are provided external to the fluid flow to provide a measure of the torque caused by the fluid flow through the insert, and a nuclear density gauge is used to measure the density of the fluid. A product of these instruments is used to obtain the mass flow rate.

Patent 3,164,718 Div. 30

ION PULSE GENERATOR COMPRISING DEFLECTOR MEANS TO SWEEP AN ION BEAM ACROSS AN APERTURED MEMBER.
Patent assigned to AEC,
by Rutledge F. King. 5 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pulse generators), (*Pulse generators, Patents), (*Fon beams, Pulse generators), Deflection, Elementary particles.

The ion pulse generator is used in research studies. The device generates periodic, short-duration groups of highly energetic particles. The use of different high-frequency sweep voltages across the deflection plates produces a Lissajous-type sweep such that with the proper phase relationship between the sweep voltages and with the proper shift of the sweep with a D.C. voltage, a selected mass of ions can be withdrawn from the beam pulser once each cycle so as to produce the desired ion burst.

Patent 3,164,722 Div. 30

RADIOACTIVE TRANSDUCER FOR SENSING PRESSURE AND THE LIKE HAVING A SOURCE OF PRIMARY RADIATION AND A TARGET FOR PRODUCING SECONDARY RADIATION.
Patent assigned to AEC,
by Arthur T. Biehl and Gustave A. Linenberger.
5 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Transducers), (*Transducers, Patents), (*Radioactivity, Transducers), Extensometers, Pressure gages, Strain gages, Flexible structures.

The transducer employs a radioactive material. It is used for measuring physical changes such as temperature, pressure, and strain in materials. The device includes a radiation source in association with a target element. It is mounted in a flexible capsule. By placing the capsule within a material, physical changes in the material alter the capsule length, hence source-target spacing, which results in a measurable change in the secondary radiation emitted from the target.

Patent 3,164,983 Div. 30, 2

HORIZONTAL DISPLACEMENT METER.
Patent assigned to Army,
by Beauregard Perkins, Jr. and Willis F. Jackson.
12 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Meters), (*Meters, Patents), (*Soil mechanics, Meters), Design.

The device determines the absolute transient motion of the ground particle from an explosion above or below the surface of the ground or by the impact or a large mass on the surface of the ground. The relative motion between the weight and the inner case may be recorded by attaching a suitable transducer such as a linear differential transformer, or a slidewire potentiometer having a contact arm carried by the weight bearing against a resistance wire. The resistance wire and weight are connected to a suitable recording instrument by electrical leads, and the instrument may be placed at a point remote from the meter as is convenient.

Patent 3,164,998 Div. 30, 12

ACCELEROMETER.
Patent assigned to Navy,
by Roger C. Wickenden. 12 Jan 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Accelerometers), (*Accelerometers, Patents), (*Guided missile components, Accelerometers), Design, Electric bridges.

The angular accelerometer is used in guided missiles. It may be mounted for measuring acceleration about a vertical, a horizontal, or oblique axis. The instrument may also be mounted on an aircraft, sled, or the like. It is an electrical device of high sensitivity and produces an electrical output indicative of significant angular acceleration being imposed on a body, while being insensitive to angular velocity and linear acceleration.

Patent 3,165,914 Div. 30

TEST SET FOR BAROMETRIC PRESSURE SWITCHES.
Patent assigned to Navy,
by Robert L. Schmidt. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test equipment), (*Test equipment, Patents), (*Barometric pressure, Electric switches), Pneumatic devices.

The apparatus is for testing a settable baroswitch assembly at pressures above and below sea level. A pneumatic system is employed for providing the three discrete pressure levels at which the baroswitches are tested. Electrical circuits are provided for indicating the operation of the barometric switches under test. Three relays must be energized in the proper sequence before an acceptance of the tested baroswitches is indicated.

Patent 3,165,917 Div. 30, 10

APPARATUS FOR MEASURING BULK MODULUS OF VISCOELASTIC MATERIAL.
Patent assigned to Army,
by Neal C. Wogsland. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Viscoelasticity), (*Viscoelasticity, Patents), (*Test equipment, Viscoelasticity), Compressive properties, Stresses, Solid rocket propellants, Materials.

The apparatus is used to observe the presence of voids in viscoelastic materials such as solid propellants, to measure their effect on the compressibility properties of the materials during pressurization. The pressure intensifier is formed as a cylindrical housing with three coaxial bores of different diameters, that is, a low pressure cylinder, an intermediate pressure cylinder and a high pressure bore. A low pressure piston, a high pressure piston and two pumps, together with inlets and outlets form part of the apparatus. Continuous recordings are made during testing.

Patent 3,165,928 Div. 30, 9

FLOW METER.
Patent assigned to Navy,
by Leo Poulos. 19 Jan 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flowmeters), (*Flowmeters, Patents), Liquids, Fluid flow, Transducers, Oscillators, Modulators, Propagation, Velocity.

The flow meter measures the flow of a liquid. The measurement is independent of the propagation velocity of the fluid medium. Two transducers are used, one in an upstream and the other in a downstream position. Four oscillators and four modulators are utilized, together with other components, to obtain a reading from a divider.

Patent 3,165,934 Div. 30

ACCELEROMETER.
Patent assigned to Navy,
by Allen E. Smoll and Weyman S. Crocker. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Accelerometers), (*Accelerometers, Patents), Circuits, Acceleration, Design, Friction, Analog-to-digital converters, Rotation, Vibration.

The apparatus measures the acceleration of a body. The movement of a seismic mass supported within a housing is correlated to the acceleration of the body. Acceleration is converted into digital pulses from an analog signal.

Patent 3,166,133 Div. 30

SEALING MEANS.
Patent assigned to AEC,
by Donald W. Hall and Bryce D. Troyer. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hydraulic seals), (*Hydraulic seals, Patents), Weight.

The force-transmitting seal arrangement is particularly suitable for use in environments where radioactive materials are contained in an enclosed space. The seal arrangement is shown extending through the upper wall of a conventional dry box. It is so positioned that a weighing mechanism may be located externally of the dry box and be operatively attached to the force-transmitting portion of the seal arrangement. Contaminated materials within the dry box are weighed without endangering working personnel.

Patent 3,166,136 Div. 30

APPARATUS FOR WEIGHING MATERIAL IN A SEALED ENCLOSURE.
Patent assigned to AEC,
by Raphael T. Coffman. 19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hermetic seals), (*Hermetic seals, Patents), Weight, Plutonium, Pressure, Pipes.

The seal construction enables a mass in a large sealed compartment to be weighed by a weighing apparatus outside the compartment. The material being weighed may be plutonium. The seal construction balances out the pressure differences between the exterior and the interior of the enclosure and offers no resistance to movement of the force transmitter.

Patent 3,166,928 Div. 30

ELECTRICAL AUTOMATIC DEW POINT HYGROMETER.
Patent assigned to Navy,
by Justin M. Jackson, Kazuyuki R. Ono, William J. Superior, and Charles W. Thornthwaite. 26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hygrometers), (*Hygrometers, Patents), (*Dew point, Hygrometers), Gas flow, Moisture, Temperature, Thermoelectricity, Heaters, Pumps, Automatic.

The apparatus obtains a synchronous running index of the dewpoint of successive portions of a gas flowing in contact with a surface. A thermoelectric heat pump affixed to the surface is responsive to the difference between the temperature of the surface and the dewpoint of the gas portion in contact with the surface for bringing the temperature of the surface to the dewpoint. A continuous index of the dewpoints is then obtained.

Patent 3,167,244 Div. 30

AUTOMATIC OR MANUAL MULTIPLE PROGRAMMER.
Patent assigned to Commerce,
by Anthony A. Berlinsky and Martin J. Brennan.
26 Jan 65 Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Office equipment and supplies), (*Office equipment and supplies, Patents), Circuits, Control systems, Automatic, Punched cards, Machines, Multiple operation.

The programmer is for controlling a key punch machine. A punched card is used. The terminals of each female member of several program connectors is wired to a set of circuits that control a machine in performing various operations. The male member of each connector has several groups of terminals wired together as desired in programming operations, which are performed by the machine when a male and female member engage. The connectors may be engaged either automatically or manually, as desired.

Patent 3,167,695 Div. 30

LIQUID LEVEL CAPACITANCE PROBE.
Patent assigned to AEC, Unclassified patent
by John C. Bronson. 26 Jan 65
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Liquid level gages), (*Liquid level gages, Patents), (*Liquefied gases, Liquid level gages), Probes (Electromagnetic), Capacitance, Capacitors, Stainless steel, Porous metals, Powder alloys, Electrical equipment, Manufacturing methods, Circuits, Errors, Corrections.

The liquid level capacitance probe is especially adapted for use with liquefied gases. The porous probe is made from a sintered porous metal such as stainless steel. The porous material allows a free transfer of gas through the material whereby false readings are eliminated. The circuit for indicating the liquid level may be the type shown in patents No. 2,807,956 and 2,882,728.

Patent 3,167,749 Div. 30, 32

MAGNETIC CORE SHIFT REGISTER CIRCUIT.
Patent assigned to Navy,
by James W. Sedin and Robert E. Wesslund.
26 Jan 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Circuits), (*Circuits, Patents), (*Data processing systems, Magnetic cores), Data storage systems, Computer storage devices, Input-output devices, Winding.

The magnetic cores are used in storage, logical and memory devices in electronic data handling systems. The shift register includes a chain of information storing cores, input, output and advance windings on each core, blocking windings in a specific arrangement, and rectifying elements in series with all three windings of the series connected windings and other rectifying elements in shunt across the input winding.

Patent 3,169,219 Div. 30, 7

OPEN WIRE DIRECTIONAL ELECTROMAGNETIC COUPLER.
Patent assigned to Navy,
by Richard K. Royce. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Wave analyzers, Patents), (*Patents, Wave analyzers), (*Transmission lines, Wave analyzers), Standing wave ratios, Coaxial cables, Measurement, Electromagnetic waves.

The device is for wave energy analysis in a parallel two wire transmission line system. The device may be permanently installed as a continuous monitoring unit. The tester includes two coaxial line sections which are mounted on a plastic bracket with four C-shaped elements which suspend the bracket from two parallel open wire lines. Conductors lead from the coaxial sections to a measurement device.

Patent 3,169,238 Div. 30, 8

INDICATING SYSTEMS.
Patent assigned to Navy,
by Samuel Pure. 9 Feb 65.
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Display systems), (*Display systems, Patents), (*Digital systems, Display systems), Design.

The system facilitates remote indication in digital form of information derived from an impedance remotely varied in accordance with the variation of some condition, for example, the number of pulses received from a pulse source. A preferred embodiment permits a counter mechanism to be positioned in accordance with the conductive conditions of an electronic pulse counter.

PB-166 785 Div. 30
CFSTI Prices: HC$4.00 MF$1.00

Stanford Research Inst., Menlo Park, Calif.
A SURVEY AND ASSESSMENT OF PROGRESS IN SWITCHING THEORY AND LOGICAL DESIGN IN THE SOVIET UNION.
Final rept.,
by William H. Kautz. May 64, 128p
Contract AF19 628 2903, Projs. 4641, 4505, Task 464101
AFCRL 64-452; AD 443 860
Unclassified report

Descriptors: (*Digital computers, Reviews), (*Switching circuits, Theory), (*Computer logic, Design), Bibliographies, Coding, Computer storage devices, Analysis, USSR, United States.

A comprehensive technical survey of Soviet switching theory and its applications to the logical design of digital systems reveals that, despite considerable activity (600 papers and books), the average state of the art in the U.S.S.R. is somewhat behind that in the U. S. However, there are a large number of noteworthy contributions, particularly in those aspects of the field dealing with complexity estimates of switching networks, synthesis of multiterminal circuits, the selection of logical primitives (building blocks), and certain minimization problems. The report evaluates and compares the Soviet position with that in the West, and summarizes the significant technical contributions. Recommendations are offered for monitoring Soviet progress in the future, and for initiating research in the United States in several special problem areas of switching theory. (Author)

PB-166 830 Div. 30, 2, 4, 17, 25
CFSTI Prices: HC$1.25 MF$0.75

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Mar 65, 60p
Unclassified report

Descriptors: (*Naval research, Reports), (*Sea water, Materials), (*Radio astronomy, Naval research), Digital systems, Atmosphere, Astrophysics, Chemstry, Electricity, Mathematics, Mechanics, Metallurgy, Nuclear physics, Atoms, Radio communication systems.

Complete papers: Collection of slick-forming materials from the sea surface; and NRL progress in radio astronomy. Summaries are given of research in the following fields: atmosphere and astrophysics, chemistry, electricity, mathematics, mechanics, metallurgy, nuclear and atomic physics, and radio.

PB-166 861 Div. 30, 32
CFSTI Prices: HC$1.00 MF$0.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
A REVISED 'LOGICAL PATTERN' RECOGNITION PROGRAM,
by R. E. Bonner. 7 Mar 63, 10p Rept. no. 17-117
Unclassified report

See also PB-166 862, PB-166 863.

Descriptors: (*Pattern recognition, Programming (Computers)), (*Character recognition, Programming (Computers)), Computer logic.

In a previous paper (R. Bonner. 'A 'Logical Pattern' Recognition Program, IBM Journal, July 1962) an attempt was made to automate the logic design for a particular character recognition machine. The machine-designed logic resulting from the use of the computer program was much more costly than the logic resulting from human design. This paper describes revisions in and additions to the original program which were aimed at reducing the cost of the resultant design. The same character recognition problem was tried using the new programs and improved results were obtained. (Author)

PB-166 862 Div. 30, 32
CFSTI Prices: HC$2.00 MF$0.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
A SEQUENTIAL PATTERN RECOGNITION PROGRAM,
by R. E. Bonner. 5 Feb 63, 37p Rept. no. 17-116
Unclassified report

See also PB-166 861, PB-166 863.

Descriptors: (*Pattern recognition, Programming (Computers)), Sequential analysis, Speech recognition, Electro encephalography, Subject indexing.

A number of extra constraints are added to the usual problem of forming a pattern recognition scheme using adaptive techniques. These require that the system formed be: (1) capable of adding a new class without requiring excessive change of the original structure; (2) able to handle sequential patterns as generated by events which occur over a period of time; and (3) able to predict parts of the sequential pattern. A particular scheme is simulated on a large digital computer and tested on problems in speaker identification, speech recognition and electroencephalogram recognition. (Author)

PB-166 863 Div. 30, 32
CFSTI Prices: HC$1.00 MF$0.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
SOME CLUSTERING TECHNIQUES,
by Raymond E. Bonner. 20 Sep 63, 44p
Rept. no. TR-17-118 Unclassified report
Available copy will not permit fully legible reproduction.

Descriptors: (*Data, Processing), (*Subject indexing, Mathematical analysis), Automation, Computers, Programming (Computers), Medical research, Factor analysis, Set theory, Data processing systems.

The problem of 'organizing' a large mass of data is a frequently occurring one in research. Normally what is required is some 'generalization' to compress this data so that we can think about it more easily. A primitive step in the process but one which is often useful can be identified as the 'clustering' problem. This involves conceiving of methods for gathering together data which is 'similar' into a 'cluster' in the hope that from such a grouping a generalization can more easily be formed. This paper describes a number of methods, implemented by 7090 computer programs, which can be used to do 'clustering'. A 'clustering' problem in the field of medical research is used as an example to illustrate and compare these methods. (Author)

31. Ships and Marine Equipment

Patent 3,166,196 Div. 31

DETACHABLY STACKED CHOCK STOWAGE APPARATUS.
Patent assigned to Navy,
by Ralph F. Hereth and Richard L. Linkletter.
19 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Chocks), (*Chocks, Patents), (*Guided missiles, Storage), Ships, Handling.

The apparatus is for storing missiles and missile boosters aboard ship. A plurality of chocks are used, the chocks being of two types only and these types being known as the fixed base support chocks and the detachable stacking chocks. In the preferred form, a plurality of vertical stanchions also may be employed. In assembling the apparatus, a detachable chock is pivotally supported on the base chock and other detachable chocks then may be pivotally supported one on top of the other to form a stack. Also, when assembled the structure includes a plurality of stacks arranged side by side in parallel rows.

Patent 3,168,955 Div. 31

APPARATUS FOR LIGHTERING CARGO VESSELS.
Patent assigned to Army,
by Richard W. Black. 9 Feb 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Handling), (*Handling, Patents), (*Cargo, Handling), Yard craft, Cargo ships, Amphibious vehicles, Hoists, Elevating gear.

The apparatus is carried by a cargo ship for assembling and unitizing cargo removed from the ship's hold and depositing the cargo in amphibious lighters located alongside the ship and secured in fixed position relative to the ship. The system includes trackways, elevators and hoists and hydraulic mechanisms for operating the apparatus.

32. Miscellaneous Arts and Sciences

Patent 3,165,395 Div. 32

METHOD FOR THE PRODUCTION OF GRANULAR HIGH-NITROGEN AND MIXED FERTILIZERS.
Patent assigned to TVA,
by Isaac W. McCamy, James L. Graham, and Milton R. Siegel. 12 Jan 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fertilizers), (*Fertilizers, Patents), Manufacturing methods, Processing.

The process includes spraying a highly concentrated solution of the appropriate salts onto a cascading bed of fine solids maintained in a pan granulator, the solution being essentially the same composition as the final products; drying the resulting granular product; screening the resulting granular product to recover product-size material therefrom; cooling the onsize product; and crushing, cooling, and returning the oversize product, along with the undersize product, as recycle to the pan granulator.

PB-166 762 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS. PUBLICATION 4a. DISCOURSE ANALYSIS MANUAL,
by Z. S. Harris. 1957, 13p Unclassified report

Descriptors: (*Language, Analysis), Classification, Information retrieval.

Discourse analysis is a method of seeking in any connected (continuous) linear material, whether language or language-like, some structure such as would permit comparisons, interpretations, etc. The manual is intended to give scientists who may check or use the results of discourse analysis a survey of the operation, and to give investigators who apply the analysis an overall view.

PB-166 791 Div. 32, 30
CFSTI Prices: HC$1.00 MF$0.50

Documentation, Inc., Bethesda, Md.
MATREX INDEXING MACHINE.
Final rept.,
by Eugene Miller. Jan 57, 26p Unclassified report

Report includes Appendix, (Redesigned) Matrex Indexing Machine, Mark II.
Revised and reprinted as The Prototype Mechanical ALPHA-MATREX Machine, In Taube M., and others. The Mechanization of data retrieval, p. 1-30, Washington, D. C., Documentation Inc., 1957.
Submitted to The National Science Foundation.

Descriptors: (*Information retrieval, Punched cards), (*Electronic accounting machines, Information retrieval), (*Subject indexing, Punched cards), Input-out devices, Search theory, Design, Operation, Feasibility studies.

The feasibility of constructing a simple mechanical index by the use of the MATREX INDEXING MACHINE is discussed. The MATREX consists of three principal elements: (1) a card selection device; (2) an input fixture and drill; and (3) a readout lightbox. For the MATREX, as in a punched-card sorter, there is a direct, one-to-one relation between the input code and readout. The data are not transformed in any way. The MATREX utilizes the principle of searching a matrix rather than searching a linear arrangement of items. Results concerning the ultimate design requirements, the economics of mechanical indexes, and the operational conventions and requirements are presented.

PB-166 793 Div. 32
CFSTI Prices: HC$4.00 MF$0.75

Center for Documentation and Communication Research, Western Reserve Univ., Cleveland, Ohio.

CASE HISTORIES: PHASE REPORT,
by Jean Smith, Thomas G. Morris, Alan Rees, and Jessica S. Melton. 1962, 115p
Grant NSF G10338

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Information retrieval, Search theory), (*Search theory, Documentation), (*Subject indexing, Effectiveness), Data processing systems, Computers, Automatic, Programming (Computers), Indexes, Errors, Corrections, Metallurgy.

The immediate objective of the study is to investigate the effect of alternate search strategies for each of a number of questions on the quantity and type of responses, in order to be able to discover the most efficient search programs for these questions, so as to be able to extend this knowledge to the construction of better search programs for all operationally serviced questions. This is part of a broader study on the effect of various search strategies on the results of machine searches.

PB-166 794 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

National Book League, London (England). Social Sciences Documentation.
THE PREPARATION FOR TESTS OF THE KYLE CLASSIFICATION FOR THE SOCIAL SCIENCES,
by Barbara Kyle. Feb 62, 33p Rept. no. R-1
Grant NSF G9176

Unclassified report

Descriptors: (*Social sciences, Documentation), (*Documentation, Social sciences), Classification, Bibliographies, Indexes, Reports, Information retrieval, Subject indexing.

PB-166 795 Div. 32
CFSTI Prices: HC$5.00 MF$1.00

College of Aeronautics, Cranfield (England).
THE FIRST STAGE OF AN INVESTIGATION INTO THE COMPARATIVE EFFICIENCY OF INDEXING SYSTEMS,
by Cyril W. Cleverdon. Sep 60, 174p

Unclassified report

Rept. on ASLIB Cranfield Research Proj.
See also PB-162 342.

Descriptors: (*Subject indexing, Effectiveness), (*Information retrieval, Subject indexing), Indexes, Analysis, Statistical analysis, Aircraft, Aerodynamic characteristics, Operations research, Control, Efficiency, Classification.

A study was initiated on the comparative efficiency of four indexing systems: the Universal Decimal Classification, an alphabetical subject index, a special facet classification, and the Uniterm system of coordinate indexing.

PB-166 796 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

College of Aeronautics, Cranfield (England).
THE TEST PROGRAMME OF AN INVESTIGATION INTO THE COMPARATIVE EFFICIENCY OF INDEXING SYSTEMS.
Interim rept.,
by Cyril W. Cleverdon. Nov 60, 88p

Unclassified report

Rept. on Aslib Cranfield Research Proj.
Research supported by the National Science Foundation, Washington, D. C.
See also PB-162 342, PB-166 795.

Descriptors: (*Subject indexing, Effectiveness), (*Information retrieval, Subject indexing), Classification, Control, Analysis, Operations research, Indexes.

A study was made of the indexing of 18,000 documents under controlled conditions. The main objective was to compare the efficiency of four systems: the Universal Decimal Classification, an alphabetical subject index, a special facet classification, and the Uniterm system of coordinate indexing.

PB-166 797 Div. 32
CFSTI Prices: HC$1.00 MF$0.50

College of Aeronautics, Cranfield (England).
THE COMPARATIVE EFFICIENCY OF INDEXING SYSTEMS.
Progress rept.
Jun 59, 11p

Unclassified report

Rept. on Aslib Cranfield Research Proj. Research supported by the National Science Foundation, Washington, D. C.
See also PB-162 342.

Descriptors: (*Subject indexing, Effectiveness), (*Information retrieval, Subject indexing), Classification, Analysis, Indexes, Operations research, Aerodynamic characteristics.

An investigation was made into the comparative efficiency of four indexing systems: the universal Decimal Classification, alphabetical, facet coordinate, and uniterm.

PB-166 798 Div. 32, 4, 23, 30
CFSTI Prices: HC$4.00 MF$1.00

Case Inst. of Tech., Cleveland, Ohio. Operations Research Group.
AN OPERATIONS RESEARCH STUDY OF THE SCIENTIFIC ACTIVITY OF CHEMISTS.
Final rept.
Nov 58, 123p

Unclassified report

Research supported by the National Scientific Foundation, Washington, D. C.

Descriptors: (*Operations research, Scientific research), (*Scientific personnel, Time studies), (*Documentation, Chemistry), (*Chemistry, Operations research), Classification, Periodicals, Symposia, Personnel management, Information retrieval.

A study was made of the manner in which industrial chemists spend their time and the factors which determine the way in which this time is allocated. The results included the following points: (1) the chemist spends more time in scientific communication (16.5 hrs/wk) than in the rest of his professional activities combined; (2) twice as much time is spent working with recorded information as with oral, although oral communication is about twice as time consuming per unit of information transmitted;

(3) there are an average of approximately 14 chemical readers of each message written by a chemist, and an average of only one chemical listener for each chemical speaker; (4) nine journals account for nearly half the articles read by chemists; (5) research units in various industries do not allocate time in the same way, the major factors affecting this allocation being personnel structure and financial structure; (6) as literature becomes more easily available to the chemist, he spends more time reading the material.

PB-166 799 Div. 32
CFSTI Prices: HC$4.00 MF$1.00

Texas Univ., Austin.
MACHINE LANGUAGE TRANSLATION STUDY.
RESEARCH ON THE MACHINE TRANSLATION OF GERMAN.
Quarterly progress rept. no. 7, 1 Nov 60-31 Jan 61, by E. D. Pendergraft and L. W. Tosh. 31 Jan 61, 122p
Contract DA36 039SC78911
AD 255 751

Unclassified report

See also: PB-166 800.

Descriptors: (*Machine translation, Language), Programming (Computers), Programming languages, Automatic, Mathematical models.

Progress is reported toward the development of a generalized computer system to implement translation of natural languages. The MT System will have two major functions: (a) a utility function that will compile, verify and optimize linguistic data of specific languages for the generalized translation algorithm, and (b) a production function to carry out the translation algorithm itself. Linguistic procedures being used in the preparation of German and English data for the system are described. Two appendices of these data are included in the report. The beginning of a program to improve the capabilities of the translation algorithm through mathematical research is explained. (Author)

PB-166 801 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
COMPUTER-AIDED RESEARCH IN MACHINE TRANSLATION.
Progress rept. no. 1.
19 Jul 62, 54p Rept. no. C157-2U3

Unclassified report

Research supported by the National Science Foundation, Washington, D. C.

Descriptors: (*Machine translation, Computers), (*Programming (Computers), Machine translation), Language, Vocabulary, Dictionaries, Punched cards, Systems engineering, Errors, Automatic, Analysis, Scientific research.

Progress is reported on research on the following topics: (1) Dictionary compilation. (2) Cyclical improvement of the translation program and the dictionary based on the automatic comparison of human and machine translation. This program is referred to as TED (Translation Error Detector). (3) Study of overall system consideration. Five different fields of study were chosen: Botany, Biology, Soil Science, Social Science, and Fiction. The Russian and English keypunching instructions and, edit routine were revised. The Russian and English text was for the most part keypunched. Programs in constant use have been changed over to Space Technology Laboratories' programming system. A listing program for missing words was checked out, and a portion of the missing words from the text was grammar coded. Tentative rules for the TED program were established, hand simulated, and programmed in part.

PB-166 807 Div. 32
CFSTI Prices: HC$7.00 MF$1.50

Computation Lab., Harvard Univ., Cambridge, Mass.
INFORMATION STORAGE AND RETRIEVAL.
Dec 64, 302p Scientific rept. no. ISR-8

Unclassified report

Rept. to the National Science Foundation.

Descriptors: (*Information retrieval, Data processing systems), (*Programming (Computers), Information retrieval), Documentation, Computers, Indexes, Programming languages, Dictionaries, Data storage systems, Input-out devices, Abstracting, Correlation techniques, Mathematical analysis, Statistical processes.

Contents:
The SMART (Salton's Magical Automatic Retriever of Text) system - typical processing sequences, by Michael Lesk
The SMART automatic text processing and document retrieval system, by Michael Lesk
Performance indices for document retrieval systems, by Joseph Rocchio
The evaluation of automatic retrieval procedures - selected test results using the SMART system, by Gerard Salton
Automatic phrase matching, by Gerard Salton
A compact format for criterion tree specification, by Alan Lemmon
Dictionary construction and updating, by Claudine Harris
The extended SMART system, by Tom Evslin
Adapting SMART to the M.I.T. computible time-sharing system, by Mark Crane
Test design and detailed retrieval results, by Joseph Rocchio and Margaret Engel

PB-166 813 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECT. 1. CO-OCCURRENCE AND TRANSFORMATION IN LINGUISTIC STRUCTURE,
by Zellig S. Harris. 1957, 60p

Unclassified report

Pub. in Language (U. S.) v33 n3 p283-340 Jul-Sep 1957.

Descriptors: (*Language, Analysis), Vocabulary.

This paper defines a formal relation among sentences, by virtue of which one sentence structure may be called a transform of another sentence structure (e.g. the active and the passive, or in a different way question and answer). The relation is based on comparing the individual co-occurrences of morphemes. By investigating the individual co-occurrences, we can characterize the distribution of certain classes which may not be definable in ordinary linguistic terms. We can then proceed to define transformation, based on two structures having the same set of individual co-occurrences. This relation yields unique analyses of certain structures and distinctions which could not be analyzed in ordinary linguistic terms. It replaces a large part of the complexities of constituent analysis and sentence structure, at the cost of adding a

level to grammatical analysis. It also has various analytic and practical applications, and can enter into a more algebraic analysis of language structure than is natural for the usual classificatory linguistics. A list of English transformations is given. (Author)

PB-166 814 Div. 32
CFSTI Prices: HC$3.00 MF$0.75

Pennsylvania Univ., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS. 21. SYNTACTIC COMPLETION ANALYSIS AND THEORIES OF GRAMMATICAL CATEGORIES,
by H. Hiz. 1959, 58p
Unclassified report

Research supported by the National Science Foundation, Washington, D. C.
Available copy will not permit fully legible reproduction.

Descriptors: (*Language, Analysis), Classification, Vocabulary, Theory.

The essay attempts to compare the grammatical analysis presented in PB-166 760, PB-166 789, PB-166 770, PB-166 772, and PB-166 773 with some other frameworks of syntactic studies. The aim of the comparison is to obtain a suitable symbolic apparatus for the study of grammatical structures and to develop a symbolism which in principle could be applied, to other languages besides English. The analysis contained in the above-listed reports is referred to as the syntactic completion analysis, for its principal idea seems to be the search for these words, or strings of words, which complete certain strings to form certain other strings of some classification.

PB-166 828 Div. 32, 16
CFSTI Prices: HC$1.00 MF$0.50

American Inst. of Biological Sciences, Washington, D. C.
MANUAL PREPARATION OF A PERMUTED-TITLE INDEX,
by Paul C. Janaske. 1962, 13p
Unclassified report

Pub. in A. I.B.S. Bulletin (U.S.) v12 n6 p53-65 Dec 1962.
Available copy will not permit fully legible reproduction.

Descriptors: (*Indexes, Preparation), (*Subject indexing, Biology), (*Biology, Subject indexing), Professional personnel, Information retrieval.

In an effort to evaluate in indexing system using the same principles involved in machine techniques, the Biological Sciences Communication Project produced a permuted-title index on a manual basis. In developing the procedure, several basic principles were used as guidelines: that the procedure would be adaptable and useful to the publication staff of a single scientific journal, that the procedure would provide for a minimum amount of professional staff time, that it should not involve other than conventional office equipment, and that it should include a cumulative feature so that the work done for one volume could be easily cumulated annually or at some other time interval. The 'AIBS Bulletin' was used for the demonstration. The resulting subject and author indexes are included.

PB-166 845 Div. 32, 16
CFSTI Prices: HC$3.00 MF$0.75

George Washington Univ., Washington, D. C.
THE NEWS PUBLICATION AS A MEDIUM OF SCIENTIFIC COMMUNICATION, AN ANALYSIS OF ITS CONTENT, FORMAT, AUDIENCE, AND SOURCE,
by Philip L. Dopkowski. 13 Jan 64, 98p
Grant NIH7T1GM1244 01
Unclassified report

Also includes Biological Sciences Communication Proj.

Descriptors: (*Periodicals, Scientific research), (*Scientific organizations, Periodicals), Reports, Newspapers, Information retrieval, Biology, Scientific personnel, Effectiveness.

Combinations of the results of both this study and those of a prior investigation of the history and development of scientific and technical periodicals point to two conclusions: (1) The news publication is repeating in the 20th Century practices characteristic of the 17th-18th Century periodical of disseminating to its audiences notices and digested forms of the still too-numerous primary record, and (2) The news publication is serving the additional purpose, sociological in nature, of contributing toward the fulfillment of the scientist's needs for recognition, status, and prestige--previously obtainable through a variety of other means. A third conclusion, based on the results of the format analysis, is that the news publication attempts to ape the more formal media with respect to its physical characteristics and regularity of issue. The news publication thus emerges as an historical carry-over with a modern appendage, which seeks to achieve the appearance of permanence and sophistication. As such, the efficiency and effectiveness with which it operates as a medium for scientific communication appears highly questionable.

PB-166 864 Div. 32
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
STUDIES IN MACHINE TRANSLATION, 8: MANUAL FOR POSTEDITING RUSSIAN TEXT,
by K. E. Harper, D. G. Hays, and B. J. Scott.
15 Jul 60, 41p Rept. no. RM-2068
Contract AF49 638 700
AD 249 679
Unclassified report

Descriptors: (*Machine translation, Documentation), (*Documentation, Machine translation), Language, Coding, Feedback, Control systems, Computers, Errors, Reports, USSR, Scientific research.

The study discusses 'postediting,' which refers to the analysis of partially machine-translated Russian text for system errors. The posteditor encodes whatever changes are required in the text, produced by the machine, to obtain an accurate, readable English equivalent. He also encodes necessary corrections to the machine-generated structural analysis of each sentence in preparation for linguistic analysis. His changes reveal--in the manner of a feedback control mechanism--the shortcomings of the machine translation program. The objective of the research process is to reduce or conceivably to eliminate the work of the posteditor. (Author)

PB-166 865 Div. 32, 30
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
STUDIES IN MACHINE TRANSLATION, 9: BIBLIOGRAPHY OF RUSSIAN SCIENTIFIC ARTICLES,
by H. P. Edmundson, K. E. Harper, D. G. Hays, and A. M. Koutsoudas. 16 Oct 58, 35p Rept. no. RM-2069
AD 210 147 Unclassified report

Descriptors: (*Machine translation, Scientific research), (*Reports, USSR), (*USSR, Reports), Documentation, Bibliographies, Periodicals, Catalogs, Physics, Mathematics.

The ninth RAND study of computer applications to language translation is a catalogue of the Russian scientific articles currently available at RAND in punched-card form. Six corpora of physics and two of mathematics comprise altogether 225 articles, totaling 227,752 running words. A general introduction to this area of research is given in Research Memorandum RM-2060, while a description of the codes and card formats used in punching this text is presented in Research Memorandum RM-2064. The present paper is of most interest to system and procedure designers who require textual material for research or test purposes. (Author)

PB-166 877 Div. 32
CFSTI Prices: HC$1.00 MF$0.75

Federal Council for Science and Tech., Washington, D. C.
COSATI SUBJECT CATEGORY LIST.
Dec 64, 60p
AD 612 200

Unclassified report

Descriptors: (*Documentation, Classification), (*Subject indexing, Classification), (*Classification, Handbooks), Reports, Scientific research, Information retrieval, Indexes.

The Subject Category List presented was endorsed by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology as a uniform subject arrangement for (1) the announcement and distribution of scientific and technical reports which are issued or sponsored by Executive Branch Agencies, and (2) for management reporting. The list is a two-level arrangement consisting of 22 major subject fields with a further subdivision of the fields into 178 groups. Scope notes are included for each group. Abstracts, citations and the like, for announcement purposes, can be gathered into these broad subject fields or groups for display to the user. For distribution purposes, these fields or groups may likewise be employed. Similarly, the fields or groups may be useful for arranging projects, tasks, or programs for management reporting purposes. (Author)

33. Transportation

No Entries

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ACCELERATION TOLERANCE	12S PAT-3165355
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	30S PAT-3165934
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	02S PB-166 842
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	12S PAT-3166014
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PB-166 813	32S	$3.00	$0.75
PB-166 814	32S	$3.00	$0.75
PB-166 815	10S	$2.00	$0.50
PB-166 816	10S	$2.00	$0.50
PB-166 817	10S	$2.00	$0.50
PB-166 819	10S	$2.00	$0.50
PB-166 820	10S	$3.00	$0.75
PB-166 823	2S	$1.00	$0.50
PB-166 824	16S	$1.00	$0.50
PB-166 825	29S	$3.00	$0.75
PB-166 826	16S	$1.00	$0.50
PB-166 827	29S	$2.00	$0.50
PB-166 828	32S	$1.00	$0.50
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PB-166 780	7S	$4.00	$1.00
PB-166 781	9S	$4.00	$0.75
PB-166 783	22S	$3.00	$0.75
PB-166 785	30S	$4.00	$1.00
PB-166 791	32S	$1.00	$0.50
PB-166 793	32S	$4.00	$0.75
PB-166 794	32S	$2.00	$0.50
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PB-166 799	32S	$4.00	$1.00
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• The Department of Commerce maintains Field Offices in the cities listed below for the purpose of providing ready access to the reports, publications, and services of the Business and Defense Services Administration, Bureau of International Commerce, Clearinghouse for Federal Scientific and Technical Information, Office of Business Economics, and the Bureau of the Census. Information on activities of the National Bureau of Standards, Patent Office, and the Area Redevelopment Administration is also available.

• Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents and stock a wide range of official Government publications relating to business. Each office maintains an extensive business reference library containing periodicals, directories, publications, and reports from official as well as private sources.

• Approximately 600 Chambers of Commerce, Manufacturers Associations, and similar business groups are official Cooperative Offices of the Department where many of the basic publications and reports of the Department are on file and available for consultation. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Department field office.

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Housing Statistics
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Estimates on Population Movements
National Income Statistics
Regional Trends in United States Economy
Biennial Volume on Business Statistics
Current Releases and Business Indicators
Research Sources on Market Potentials
Development and Maintenance of Markets
Reports on Governmental and Private Technical Research
Regional and Community Development Techniques
Information on Government Procurement, Sales and Contracts

FOREIGN TRADE

Tariff Rates of Foreign Countries on Specific American Products
Regulations Bearing on the Control of Exchange Abroad
Administration of Regulations Imposing Import Quotas and the Details of Import Licensing Procedures in Overseas Markets
Facts on Economic and Trade Conditions
Business Information on Foreign Firms
Documentation of Export and Import Shipments, Both Here and Abroad
Statistical Data on Both Imported and Exported Products
Assistance on Export Regulations and Problems, Including Prompt Special Service in Emergency Situations
Trade Investment and Licensing Opportunities
Foreign Lists of Buyers and Suppliers

Department Field Offices

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Baltimore, Md., 21202, 305 U.S. Customhouse, Gay and Lombard Streets. Phone: PLaza 2-8460.
Birmingham, Ala., 35203, Title Bldg., 2030 Third Ave., North. Phone: 325-3131.
Boston, Mass., 02110, Room 230, 80 Federal Street. CApitol 3-2312.
Buffalo, N.Y., 14203, 504 Federal Building, 117 Ellicott Street. Phone: 842-3208.
Charleston, S.C., 29401, No. 4, North Atlantic Wharf. Phone: 722-6551.
Charleston, W. Va., 25301, 3002 New Federal Office Building, 500 Quarrier Street. Phone: 343-6196.
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Cleveland, Ohio, 44101, 4th Floor, Federal Reserve Bank Bldg., East 6th St. & Superior Ave. 241-7900.
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Denver, Colo., 80202, 142 New Custom House, 19th & Stout Street. Phone: 297-3246.
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Los Angeles, Calif., 90015, Room 450, Western Pacific Building, 1031 S. Broadway. 688-2833.
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Minneapolis, Minn., 55401, Room 304, Federal Bldg., 110 South Fourth Street. Phone: 334-2133.
New Orleans, La., 70130, 909 Federal Office Building (South), 610 South Street. Phone: 527-6546.
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Philadelphia, Pa., 19107, Jefferson Building, 1015 Chestnut Street. 597-2850.
Phoenix, Ariz., 85025, New Federal Bldg., 230 N. First Avenue. Phone: 261-3285.
Pittsburgh, Pa., 15219, Room 2201, Federal Building, 1000 Liberty Avenue. Phone: 644-2850.
Portland, Oreg., 97204, 217 Old U. S. Courthouse, 520 S. W. Morrison Street. 226-3361.
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Richmond, Va., 23240, 2105 Federal Building, 400 North 8th Street. Phone: 649-3611.
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